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The Meaning of the Affinity of the Secotiaceae with the Agaricales

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I. Introduction.

Investigations into the affinity of certain *Secotiaceae* with certain *Agaricales* have long since proved beyond any reasonable doubt that a close and demonstrable affinity exists between these groups. These investigations were carried out either with the intention to prove the existence of and elaborate on the factual material concerning the affinity of certain taxonomic groups in both orders, or else they were done with the definite aim of showing that one group is ancestral to the other. The following genera of *Secotiaceae* (and allied *Gastromycetes*) exhibit demonstrable affinities with agarics and boletes; *Hydnangium, Elasmomyces,* the asterogastraceous (amyloid-spored) representatives of *Arcangeliella* respectively *Gymnomyces, Macowanites,* and some other genera of the same group as defined by Malençon (1931); *Gastroboletus, Truncocolumella; Galeropsis; Thaxterogaster*; *Endoptychum*; *Neosecotium, Secotium; Montagnea*; *Setchelliogaster, Nivatogastrium*; *Brauniella* and *Brauniellula*; *Weraroa.* Other examples which might be mentioned here in relation to the problem at hand and on a tentative basis are *Le Ratia* (according to some comments by Heim), *Lentodium* (according to Martin), perhaps *Richoniella* (according to Romagnesi); furthermore gastroid conditions, in cultures, of *Psilocybe* sp. (McKnight) and, in nature, of *Boletinus decipiens* (Dodge), and carpophoroids of *Acurtis.*

Taking all this evidence together — abstracting for the moment the phylogenetic conclusions or prejudices introduced by the various authors (Buchholtz, Malençon, Dodge, Lohwag, Conard, Singer, Heim, Martin, Romagnesi, Singer &

[1]) Paper read (in Spanish) on May 12, 1958 at the III South American Congress of Botany in Lima, Perú, with a summary in German.

Smith, McKnight, and others) who were involved in this particular subject — one may sum up the situation in the following way:

Very much factual material not considered in the early phases of the discussion on the phylogeny of the *Agaricales* and *Gastromycetes* has been added, particularly since the discovery of *Thaxterogaster, Brauniella,* and the latest taxonomical work of Singer & Smith [2]). It is therefore time to re-evaluate the data now at hand, based on a much more thorough knowledge of the species and genera involved. In spite of the fact that Singer and Singer & Smith have always emphasized that the interpretation of the direction of the evolutionary trends in this case as in many similar ones is not being investigated on the same level of scientific observation as descriptive and experimental data, Heim and others have drawn rash conclusions from incomplete facts and erroneously believed to have demonstrated the correctness of their views whereas, in reality, they have only added — valid or questionable: this is a controversial question — new arguments in favor of their own predilected way of looking at the whole problem. They have come out with a hypothesis, going far beyond — though in the same direction — of De Bary's original and now classical view that derived the *Gastromycetes* from the *'Hymenomycetes"*. They have developed a theory of degradation leading from certain agaric genera by a gradual process of degradational steps, deep into the *Gastromycetes*; just how deep is difficult to establish since some texts seem to indicate that Heim and Malençon are not fully agreed in their interpretation of further evolutionary development.

This being a largely academic problem, one of those that may rightly be called theoretical, and given the impossibility, at the present moment, to come to a clear-cut and absolutely valid conclusion, it may be asked whether it is worth our while to attempt to penetrate deeper into these problems, whether indeed we should go on interpreting the scientific facts in one way or another. It is my conviction that we should. We should go on for two reasons. In the first place, the problem has stimulated much valuable research in various phases of Basidiomycete morphology, anatomy, ontogeny, cytology, chemistry, habitat and area analysis, etc. and has uncovered such valuable "links" and "bridges" that this achievement — collective if I may call it so, by mycologists of different specialities and national schools, — seems worthy of being continued. Secondly, this interpretative controversy has stirred up a distinct interest in the mycological world because here we have one of the best documented affinity lines in the cryptogamic botany with the exception of the *Pteridophyta*, a

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[2]) Singer, R. & A. H. Smith. (1958) Studies on secotiaceous fungi I—VIII. (in print)

complex of questions touching on the basic problems of fungus phylogeny because of its profound implications regarding the origin of the *Eu-Mycetes* in general. And of all question complexes that might have some bearing upon the solution of such basic problems as this, the interpretation of the interrelationship of *Secotiaceae* and other *Basidiomycetes* seems to have the best prospects of being solved. Maybe this statement is overoptimistic but considering the rate at which material for the solution of the question is being unearthed, and judging by the possibilities of future palaeobotanical discoveries, it seems to me that the possible achievement in years ahead amply justifies a continuing effort to accumulate more facts and attempt their evaluation on a phylogenetic basis. By making it appear as though the problem were already solved, we do a disservice to this cause; but by evaluating from time to time the new and old facts at hand, we drive it forward.

II. Degradationalist Theories.

I shall refer to those who interpret the facts at their disposal by implying or stating that a degradational development has started in various families of agarics independently and leads into various orders of angiocarpous fungi called *Gastromycetes* which are in consequence of this hypothesis a heterogeneous assemblage of scarcely related groups, as „degradationalists", in an attempt to have a relatively short expression at hand. Heim and Malençon seem to be the most vociferous of the degradationalist theoreticians at present. They see in a *„Secotium"*-type of Basidiomycete an agaric (or bolete) which has, in response to environmental factors, permanently lost its ability to open up its pileus to expose the hymenophore. The hymenophore has then become irregular instead of strictly geopetalous, the basidia and sterigmata have lost their capacity to discharge the spores in the Agaricales manner, and this is supposed to explain the phenomenon of axially symmetrical spores supposedly produced in all „true" *Gastromycetes.* Usually passing through a secotioid stage, the evolutionary lines often lead into such groups a various *Hymenogastraceae,* while some specified or unspecified part of the other *Gastromycetes* is thought to have a different origin.

In support of their hypothesis, the degradationaliste have indicated that this development is usually or always accompanied (or induced) by a trend to adapt to more or less xerophytic or hypogeous conditions. S i n g e r & S m i t h have shown that such is not the case. Thus, the contention that the failure of hymenophore exposure in primordia or young fruiting bodies is actually at least sometimes of advantage in the respective groups, cannot be maintained. The usefulness of the veil has been the subject of previous discussions which started with L o h w a g's observations and which may now be sup-

plemented by new facts. In the first place, the veil is not always a consequence and inheritance of — or a development destined to lead to — a generally gastroid condition or development, but it will rise and disappear according to the specific structure and development of certain groups. If we consider some forms of veil as very definitely reflecting developmental patterns of the *Gastromycetes* in the *Agaricales,* or of the *Agaricales* in the *Gastromycetes,* we may discard the idea of the veil being a fortunate adaptation to extreme conditions, least of all xerophytic conditions since it is now obvious that in xerophytic mycofloras (puna, Chaco, desert, etc.) the percentage of non-veiled agarics is incomparably higher than the share of the veiled ons. It is certainly impossible to show that a slow process leading to more angiocarpous development and more complex or more persistent veils has gradually led to the point where the degraded (gastroid) lines begin. It would have to be considered naive if anyone preferred to argue that the slow and gradual evolution of the more complete and intricate velar systems was initiated by a conformity of ancient fungus strains with the later arising degradationalist theories, anticipating the future need for enveloping material to produce an angiocarpous carpophore. But how else interpret the biological necessity of the rise of pseudoangiocarpous Russulas with annulus originating in the tropical forest as alleged forerunners of the hypogeous degradation? Or why would *Amanita rubescens* or *A. farinosa,* relatively primitive according to that view, gradually acquire a more robust general veil and, on the principle that double is better than simple, an additional „annulus superus" and in some species traces of a thick velar structure, all not in extreme climatic conditions but in temperate woods?

Heim has vaguely referred to an explanation of the apparent problem he has offered when studying *Termitomyces.* He makes two statements implying that the existence of a veil in *Termitomyces* is advantageous. Secondly, assuming that this has been satisfactorily proved, he goes on to generalize on the usefulness of veils in fungi. One may indeed be rather doubtful about the first statement inasmuch as it is always difficult to show that an organ is actually advantageous unless there is better proof than H e i m's observation at hand. The development toward or away from strongly veiled forms to little veiled forms is just as marked in *Amanita,* another genus of the same family, as it is in *Termitomyces.* But even assuming that H e i m's observations imply a usefulness for the development of the carpophore in these very special conditions of rising through termite nests up to the surface, a generalisation of such a unique situation is not warranted.

The truth of the matter, as we see it, is that another hypothesis — not a new one — explains all veil formations satisfactorily by

assuming that they are inherited from similarly veiled *Secotiaceae*, unless the carpophore development which makes the veil take shape is as such a derivation of a corresponding gastromycetoid carpophore development.

The question whether or not a veil will be formed, in the *Secotiaceae*, and how, is a consequence of the combination of two factors (1) the rate of growth of the apex of the stipe in relation to other parts of the fruiting body (2) the structure of the peridium and its physical properties. It is possible that more factors enter some specific cases of volva formation. The volva is, under this aspect, not in principle different from all other veil formations, but merely a form of peridial remainder whereby the continuation of the columella enlarges and stretches so much more rapidly than the gastrocarp. especially the gleba, that there is a stipe portion between peridium attachment and columella proper where the stipe or columella — it is difficult to decide how to call this part — is not surrounded by the gleba yet still within the continuation of at least an outer layer of the peridium. We can see easily in the *Gyrophragmium* („*Longula*")-complex how a volva may be inserted above the base and then be considered an „annulus' as such the basis of generic separation (in our opinion a very artificial one).

This originally rather variable and polymorphous formation of veil structures in the *Gastromycetes* has been inherited by those agarics derived from veiled *Gastromycetes*. While the veil is definitely inconsequential for the purposes of dissemination or as impeding or jeopardizing any other function of the fruiting body in the *Gastro*mycetes, it may be maintained as equally inconsequential or even useful (in *Termitomyces*?) in the Agaricales. But since the biological type represented by Agaricales is one in which there is a tendency to give free exit possibility to the spores at the time of their first maturing rather than later, there is, and must be, a reduction of those párts of the covering layers which are underneath the hymenophore, in other words this whole area tends to become reduced progressively earlier in the development of the carpophore, and this is why the volva is eventually reduced to an easily disappearing pulverulence in *Amanita farinosa* whereby the diminishing application of the edges of the lamellae to the apex of the stipe also reduces the possibilities of a membranous annulus superus. Where there are no corresponding ring-formations in secotiaceous related genera, these may nevertheless be induced through the characteristic development of the respective agarics or boletes — inherited from the Gastromycetes — as for example in the case of marginal veils acquired through pseudo-angiocarpous development in *Russula annulata* (according to H e i m) and *Boletinus cavipes* (according to K ü h n e r). One has only to

study the development of such species as *Hydnangium carneum* to see the origin of this type of development.

We see, then, that Heim's arguments in favor of a derivation of the *Secotiaceae, Hymenogastraceae* etc. from the *Agaricales* through reduction and degradation have lost their main attraction, viz. the easy explanation of the acquisition of velar formations as a step toward angiocarpy induced by special conditions (hypogeous carpophore development or xerophytic conditions).

We shall see further on that, likewise, all other arguments given in favor of degradationalist theories are either inconclusive, or can be countered by far better ones in favor of the opposite views. Nevertheless Morten Lange (1954) not only finds Heim's (1952) point of view „convincing" but attempts to add a new argument in its favor. He starts from the thesis that medallion clamps are a supposed „aphyllophoraceous" character. Since Lise Hansen (1954) has shown that numerous species of *Agaricales* have likewise medallion clamps, Morten Lange concludes that this is a significant argument in favor of affinity of the two groups. Since the *Aphyllophorales* with medallions cannot be considered descendants of the Agricales, it must then be concluded, always according to our Danish friend, that the *Gastromycetes,* undoubtedly related to the *Agaricales,* are descendants of the *Agaricales.* He adds other supposedly aphyllophoraceous characters such as allantoid spores, lignicolous habit, rudimentary stipe, oil found in the white spored pleurotoid agarics which are therefore thought to be of aphyllophoraceous origin.

All the characters enumerated can be found in secotiaceous fungi, including the medallions. I have seen medallion clamps in *Truncocolumella citrina.* If they were actually searched for, they would be found as commonly in other groups of *Basidiomycetes* as they are now in *Agaricales,* where I had long been aware of their occurrence — but not merely in the pleurotoid white-pink-spored species. The discovery of medallions in *Truncocolumella* should, with the same kind of logic, lead to the conclusion that *Truncocolumella* is related to *Paxillus* (which it is, at least indirectly), and to *Merulius* (which it is not). Without a thorough analysis of the tissues of not merely the *Agaricales* but the *Gastromycetes,* the medallion clamps will not add anything to the problem at hand.

It is true that allantoid spores are mainly found in those groups that are, always according to M. Lange, candidates for a closer relationship with Aphyllophorales, but then they are generally common in wood-inhabiting species where there is a tendency towards elongated hyaline spores. Wood as habitat does not necessarily express an affinity with the *Aphyllophorales* inasmuch as innumerable *Aphyllophorales* are not wood-inhabiting and numerous *Gastromycetes* (including *Weraroa, Secotiaceae)* are, not to mention the

Naematolomas, Naucorias, *Phlebopus sulphureus,* etc. Furthermore, it is not correct to introduce here, as M. Lange does, the metuloids as being a specifically aphyllophoraceous character (although the term was first employed for *Peniophora* cystidia and introduced into agaricology by me). Typical metuloids are found not only in those pleurotoid groups considered as close to the Aphyllophorales by some of our colleagues, but in *Marasmius* (where they also occur in correlation with narrow curved hyaline thin-walled spores), in *Pluteus* (e. gr. *P. amphicystis* Sing.), *Copelandia, Psathyrella, Inocybe, Galerina, Pseudohiatula, Xerula,* to mention only a few.

Lange mentions in his paper that K ü h n e r (1948) suggests that *Paxillus* occupies a position intermediate between the *Boletaceae* and the *Aphyllophorales.* Although K ü h n e r is not in favor or at least is on record of not having been in favor of my interpretation of the affinities existing between Agaricales and *Gastromycetes,* the paper quoted is, as usual in the case of this excellent and conscientious scientist, a perfectly objective and factual account and attempt at interpretation of the facts which are observed in the taxonomy of the *Paxillaceae, Gomphidiaceae, Boletaceae,* and *Strobilomycetaceae.* In fact the only difference in the final conclusions of our French friend and colleague seems to be that he does not give the veil as such a phylogenetic significance as a primitive character, but rather suggests that it might be an evolved character if only the European flora is considered. It is true that he considers the *Paxillaceae* as the probably most primitive group in the complex *Paxillus-Gomphidius-Boletus* sensu lato, and *Paxillus,* for him, is evelate. He gives, furthermore, a truly objective account of the reasons why the veil may also be interpreted as a primitive character. I wish to add at this point that my foregoing discussion of the significance of the veils in the *Basidiomycetes* represents rather an approach towards K ü h n e r's point of view, insofar as the veil is here, and particularly in cases comparable to that of the *Boletaceae,* not any more considered an a priori primitive character but rather one with diminished phylogenetic significance or perhaps not necessarily primitive. On the other hand, K ü h n e r was at that time not aware of the fact (neither was I) that *Paxillus* contains two strongly veiled species in Southern South America (by the way a center of distribution of that genus). If it is, therefore, clear that there are no major differences of opinion between the article quoted by L a n g e and my own present views, it is not equally clear to me which part of K ü h n e r's article could have been so interpreted as to suggest an intermediate position of *Paxillus* between *Aphyllophorales* and *Boletaceae* since, in reality, it suggests an intermediate position between white-spored agarics and *Boletaceae* — a suggestion which had already been taken up by

me in my treatment of *Hygrophoropsis* (*Cantharellus* p. p.) and *Cheimonophyllum* (*Pleurotus* p. p.) with the *Paxillaceae.*

While Lange's misquotation or misinterpretation of Kühner's words is obviously an exception and an error easily explained by an author's wish to find other expressions of similar speculative thought, it must be mentioned here that Heim's discussions on the subject contain almost regularly quotations of my opinions which, in that form, have never been expressed. It is of course the easiest thing in the world to convince others by quoting an obviously wrong statement and then proving that it is wrong, or by quoting another scientist as having expressed the same views as those one wishes to expose. I have already mentioned this fact in previous papers. I have only to add that I have never said that the boletes have polyphyletic origin (since I share Kühner's opinion about their almost monophyletic origin), a question about which my earlier papers as well as Lilloa **22**: 642 1949 (1951) are quite eloquent. I have the impression that Heim's failure to understand them has a very simple and innocent reason: language difficulties [3]). Moreover, there might be, here and there, in literature, a bit of an isolationist tendency which leads to a certain disregard for foreign contributions in general [4]) However, while even a local flora suffers from a disregard of the work of extralimital writers, it is completely impossible to judge a complex phylogenetic problem without weighing with equal thoroughness all available facts wherever they may come from.

Under the circumstances, one is surprised to read that my Danish friend adds to the anatomical evidence provided and to a rather obscure quotation of Kühner a further, somewhat personal „argument": He finds Heim's (1952) point of view „convincingly advo-

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[3]) Misquotations can be found in Rev. Mycol. **10**:6. 1945 (1946); Trans. Brit. Mycol. Soc. **30**:174, 175. 1948; Rev. Mycol. **15**:9 (foot note 1). 1950; **16**:141, 151. 1951.

[4]) Thus, Heim consistently quotes my pre-thesis edition of the „Monographie der Gattung *Russula*" (Hedwigia 1926) instead of the later and completer edition of 1932; he omits in his newest works all reference to my role in the history of the study of the hallucinogenic mushrooms, or to my (with A. H. Smith) publication on *Kühneromyces* (proposing a new genus for it). This spirit is also well expressed in Romagnesi's —by the way very favorable — review of my *Agaricales in modern taxonomy* where he gives, aside from some useful suggestions which we have not hesitated to accept and adopt, the following example of the spirit of geographical limitation I have mentioned: „On ne manquera pas de lui reprocher d'avoir poussé trop loin l'esprit d'analyse ... en attribuant une place déterminée à beaucoup de genres et espèces exotiques encore mal connues". As I have explained in the work analysed by Romagnesi, only those genera and species which were completely known at the time have a definite place in the classification; those exotic forms Romagnesi does not like to see represented are merely the ones neglected and ignored by some Europe-centered mycologists.

cated". I cannot see why, in the evolution of plants or animals, a spiral evolution, starting from a point A and moving to a point B, should not lead back, on a higher level, to a point A; in other words, the tendency from the gymnocarpous to the hemiangiocarpous and angiocarpous development, provided it were proven, does not necessarily imply that it is irreversible, or that a contrary evolutionary trend is impossible in some other part of the history of fungi. Shortly, we do not find Heims argument as convincing as he or Malençon, or for that matter, Morton Lange[5]), since it overworks the analogy taken from the supposed evolution of the *Tuberales* from cup fungi and the „true" *Gastromycetes* from, apparently, some gymnocarpous ancestor, to such a degree as to deny the possibility of doubt in these cases, and the admissibility of a reversed trend in others.

Since most of the literature commented on in the preceding paragraphs goes back to the manner of thinking introduced by Malençon (1931) which is a reversal of the earlier by Buchholtz (1902) and an elaboration on the now classical one of De Bary and Fayod (1889), we may as well reconsider its main argument. For Malençon, his Asterosporés Quél. em. show only an apparent similarity with the „Agarics vrais" — here we have a forerunner of the division in *Gasteromycetes agaricoides* and *Gasteromycetes vrais* — while in reality they are sharply divided from the latter, first and principally by the „nature toute spéciale de la chair dont ils sont formés", i.e. their heteromerous tissues. Right away, we wish to interpolate here that we know now that this structure is also found in other *Gastromycetes,* a fact we shall not only demonstrate but explain later on. The singularity of the macrocystidia (not so called at that time by Malençon) is likewise debatable since pseudocystidia with corresponding reactions occur in the genus *Lentinellus.* Malençon, furthermore, insists on the ornamentation and chemical reaction with iodized liquids of the basidiospores which he believes to be a common character of the whole series from *Russula* to *Hydnangium* and *Octaviania* while, in reality, we know very similar spores in genera as far removed from the Asterosporés as the genus *Bondarzewia* (polypores) while *Hydnangium* has, at least taken in the sense as com-

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[5]) Reading the paper quoted by Lange, one cannot help wondering whether Malençon (1931) with his admirable paper on the *Série des Asterosporés,* has not started a chain reaction, convincing by his well presented thesis Heim who, in turn by the time the Torrendia paper — equally excellent — was ready for publication had again convinced Malençon (1955) whose strongest argument against derivation of secotiaceous *Gastromycetes* from *Gastromycetes* of the type *Torrendia,* is the fact that Heim showed this to be impossible. True to this merry-go-round, we shall soon read that someone was convinced by Malençon „showing" that there are two phylogenetically completely different groups of so-called Gastromycetes, by studying the development of *Torrendia.*

monly interpreted, non-amyloid spores. The same is true for *Octaviania.*

Malençon proceeds then, arbitrarily, to call (rightly but without proof) the *Russulaceae* the „Asterosporés Supérieurs" which, allegedly have the following characters: Epigeous growth, a peridium (pileus), stipe, basal mycelium, lamellate hymenium (hymenophore) open towards below; spherocysts, lactifers (laticiferous hyphae), tetrasporous basidia, cystidia, subglobulose spores with asperities violet in iodine. As some of the characters here enumerated do not show up or are different in the „lower" groups, it is then assumed that the latter are members of a line of regression. The affinity of the series, enlarged by Malençon, but nevertheless mainly the same as studied by Buchholtz, Lohwag, and others before him, with the agaric genera *Russula* and *Lactarius* was nothing new. What was new and valuable in Malençon's treatment was the comparative anatomy approach. This approach helps arranging the various types in relation to the *Russulaceae* on one end and *Hydnangium* and *Octaviania* on the other, but it also helped create a phylogenetical dogma which I now call degradationalist although the latter term was created by Heim.

Which are the reasons given in 1931 which lead Malençon to accept a direction of an undoubted evolutionary trend which has later been generalized for all *Secotiaceae-Agaricales* relations as the direction more probable or less improbable than any other?

Malençon says that the spore regression takes place in four stages which are parallel with the embryology of the spore (but obviously in a reversed form, it being the *Russulaceae* which reproduce, in their sporogenesis, all four stages from *Octaviania* upwards as visualized by Malençon, viz the stage of a simple sphere, secondly an ovoid to subglobose spore symmetrically attached, thirdly piriform with the ventral region well developed but not recurved, finally the well-known shape of the eccentrically attached mature *Russula* spore). According to the Haeckel rule one might then assume a progressive differentiation. Malençon does not. He sees in the veined „plage" at the base of the peridium (or better gastrocarp) of *Arcangeliella* not the simple beginning of a zone of hymenophore or „a local absence of the peridium" revealing a structure reminiscent of the early configuration of the agaricoid hymenophore in the primordia of *Russula,* but „the homologon of the entirety of the lamellae edge of *Lactarius* and *Russula* whereby its upper limit corresponds to the margin of the pileus in these agariciform genera". While we do not doubt the existence of homology between this structure in *Arcangeliella* and some part or stage of the agaricoid hymenophore, this observation is not forceful for us as far as the direction of the evolution is concerned. Besides, we find struc-

tures much more similar to the glebal construction of the *Secotiaceae* in *Russula* (poroid and strongly anastomosing lamellae in *Russula delica* and other species) than the basal veins of some of the „asterogastraceous" genera are to the lamellae of the *Russulaceae*. It would, on the contrary, appear that a regularly formed organ is the higher developed, thus more recent one as compared with the irregular one, particularly considering the biolgical advantage a tendency toward regularity bears for the *Russulaceae*. But then, the term „degradation" would seem to take care of this common-sense argument and imply that the higher form deteriorates and regresses to a pseudo-primitive one.

There are, at every corner, in M a l e n ç o n's paper such words as „still", „already", „lost" and „remained" which suggest a dynamism which has not convincingly been shown to exist but was merely implied. The most serious drawback of M a l e n ç o n's paper is the incompleteness of the descriptive data for each of the authentic representatives of the genera studied. By hindsight, it is now easy to register some other shortcomings such as the indiscriminate use of the word cystidium since the macrocystidial type is not the only one found in asterogastraceous genera; consequently, here, we do not deal with a continuous series of degradation; indeed, the existence, in the Australian species *Cystangium sessile* of true cystidia of the leptocystidial type might be used as an argument for the non-acceptance of the degradationalist theory. The basidia, on the other hand, are not by any means, as assumed by M e l a n ç o n „constantly tetrasporous" in *Lactarius* and *Russula*. I have observed — and published on — two-spored (not mixed 2—3—4-spored forms which are common in certain sections) races of certain species of *Russula*. This evidence — which, in part, had appeared after the publication of M a l e n ç o n's paper — contradicts the hypothesis of a regression of the number of sterigmata (the only valid argument since a number smaller than a regular tetrad would have to be recognized as possible regression) inasmuch as *Macowanites* is not, as formerly assumed, different from *Russula* in this regard, and the frequent occurrence of mono-, and bi-sporous basidia in the more typically gastroid forms cannot be judged unless it is accompanied by studies of a cyto-taxonomical order which will show the significance of the various forms of sexuality for certain biological types, as for example the special condition of angicarpous hypogeous carpophores in relation to spore dispersal and chance meeting of primary mycelia with different polarities.

The most interesting, and by the way most quoted and original part of M a l e n ç o n's work consists in the appraisal of the spore development types described and illustrated by him. Although (as partly recognized by M a l e n ç o n himself in later papers) there is

more variability and diversity in this regard — especially if considered as a whole: spore-sterigma-configuration — than anticipated in the paper of 1931, it gives a completer picture of the situation than in regard to the other aspects discussed by him. Nevertheless, there is not, as foreseen by Malençon any demonstrable parallelism between spore development and carpophore development, as soon as numerous forms of this series are studied. The level where, according to Malençon, an intermediate microchemical stage has been reached (*Hydnangium* with supposedly amyloid spores whereby the amyloid mass is restricted to the tips of the spinules) is at least debatable and may either be not a general character of the genus in question but an extraordinary, rare phenomenon, or else a mistake in observation. We have not been able to study authentic material of *Martellia mistiformis,* but the figure showing one spore of this species does not represent a case different from cases frequently seen in *Russula* and *Lactarius,* Crawshay, pl. 5, no. 7 a, and 6, no. 7 b being examples (whereby the more oblique covering of the amyloid substance or amylon mixture can be explained by the more irregular distribution of the ornamentation and the heterotropic character of the spore development). Consequently, the graduality of the „disappearance" of the amyloid reaction of the spore ornamentation or, expressed more correctly, the secondary ornamentation of the spores in the astrogastroceous series, may be doubted; but at any rate, even if demonstrated for the respective species, it would hardly be a proof of regression since with at least the same right we may assume gradual acquisition of this chemical character which would have to be studied with an eye on the questions of biophysics and spore growth mechanics first touched by Locquin (1948).

There is, however, in Heim (1937) the first attempt (p. 181, 9°) to use Malençon's data as support for the degradation theory conceived as such for the first time. In Heim (1952), somewhat later, the same hypothesis is developed with shorter words, with reference to three witnesses: Buchholtz, Malençon, Heim. As we know, Buchholtz was the first to suggest the affinity of *Russula* and *Elasmomyces* (etc.) — in the opposite direction; Malençon has merely given an *opinion* without forceful arguments, and Heim is only repeating himself in this regard.

It is not a pleasant task — and not one easily abbreviated and dealt with without at least an outward appearance of polemical writing — to go through the literature of phylogeny of *Basidiomycetes* with an endeavor of showing the absence of proof or claim to superior probability as far as a hypothesis is concerned which, in some of these papers, is presented as scientifically „refuting", excluding, or what not, any theory which does not appear to be com-

patible with that of its critic [6]). I had to emphasize repeatedly that a scientific proof or an accumulation of facts so overwhelmingly pointing towards one of the two main phylogenetic possibilities that it would be unreasonable to persist in giving any credit to the opposite one, cannot be hoped for at the present time. With the present methods and materials, any such claim would be unrealistic, exaggerated, and pretentious. The foregoing paragraphs were unfortunately necessary to show that the theory of Brefeld, Buchholtz, von Höhnel, Lohwag (in their general postulates rather than in detail) and the phylogeny worked out as the most probable by myself and supported by Dodge, Zeller, and to a certain point by Gäumann had not in the least been weakened by any facts discovered since 1931, or by any reasoning introduced lately.

As a supplement to the critical revision of the main degradationalist literature, it seems to be necessary to mention also some recent writings which, although they do not contribute new facts in favor of the degradationalist view-point, are presented as or may be interpreted as supporting it.

G. W. Martin (1956) has studied *Lentodium squamulosum* Morgan which, with a single exception, had until then been considered an aberrant form, abnormality, or mutation of *Panus tigrinus*. Martin, on the other hand, citing a paper by Lyman (1907) showed that the two genera — *Panus* and *Lentodium* — are not identical, and that *Lentodium* is often fertile, having a different area and being constant in its characters which are somehow gastroid — a conclusion which I (1951) had mentioned likewise although, not knowing the fungus from collections in nature or from fertile material, I had accepted the Berkeleyan tradition which considers *Lentodium squamulosum* and *Panus tigrinus* congeneric (if not conspecific). Martin goes on to state that *Lentodium* is another case which must be considered in the light of the strong evidence of relationship existing between various agarics and the gastromycete-like genera such as *Galeropsis, Endoptychum, Thaxterogaster*. So far so good. I am perfectly willing to admit that Dr. Martin who has had fresh wild material, fertile material and cultures of this species, has been able to show that I was wrong considering *Lentodium* a synonym of *Panus*, and did

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[6]) „... et la théorie de H. Lohwag - R. Singer est alors en défaut." (Malençon 1955) — „It seems under those conditions that the trial of the ascension theory must be closed and, as Heim (1952) has written ..., it is not possible any more to see in the *Gastromycetes* the origin of the *Agaricaceae* as H. Lohwag an R. Singer thought" (translated from the same paper, p. 126). — „The hypothesis of our friend R. Singer seems to be refuted" (Heim 1948). — „Rien ne nous semble autorizer notre excellent collègue Rolf Singer a maintenir l'hypothèse qu'il a soutenu jusqu'ici sur le sens vraisemblable de l'Évolution chez les *Basidomycetes*" (Heim 1951).

not sufficiciently emphasize the gastroid character of the former. However, it seems to me that his further conclusions are entirely taken from the literature we have just shown to be inconclusive so that there is really no basis for his finding Heim's (1952) "answer" to the comments I had made regarding *Thaxterogaster* (Singer 1951) "convincing" and his final conclusion that "the existence [of *Lentodium*] furnishes an addition to the arguments favoring a derivation of the *Exogastrineae,* in Malençon's sense, from the agarics, as favored by Heim, rather than the reverse, as maintained by Singer"[7]).

McKnight (personal communication 1953, 1957) has been able to control the development of *Psilocybe* sp. in his cultures so that a gastroid aberration could be produced at will in laboratory conditions. This might be interpreted as a hint as to the origin of gastroid forms in response to environmental stimuli even in such families where no gastroid phylogenetic bridges had been discovered at the time. We shall see later that it is perfectly logical to consider such aberrations as atavistic and we shall also see that the negative proof based on the absence of a certain theoretically postulated organism in nature has, here as in many previous cases, turned out a dangerous tool in the hand of the phylogeneticist. As a matter of fact, Singer and Singer & Smith (1958) are now able to demonstrate that the *Strophariaceae* are closely related not to one but five different species of *Secotiaceae,* one of them particularly close to *Psilocybe.*

To think that the degradationalist hypothesis gains by showing that not all families of *Agaricales* can be linked with recent gastroid

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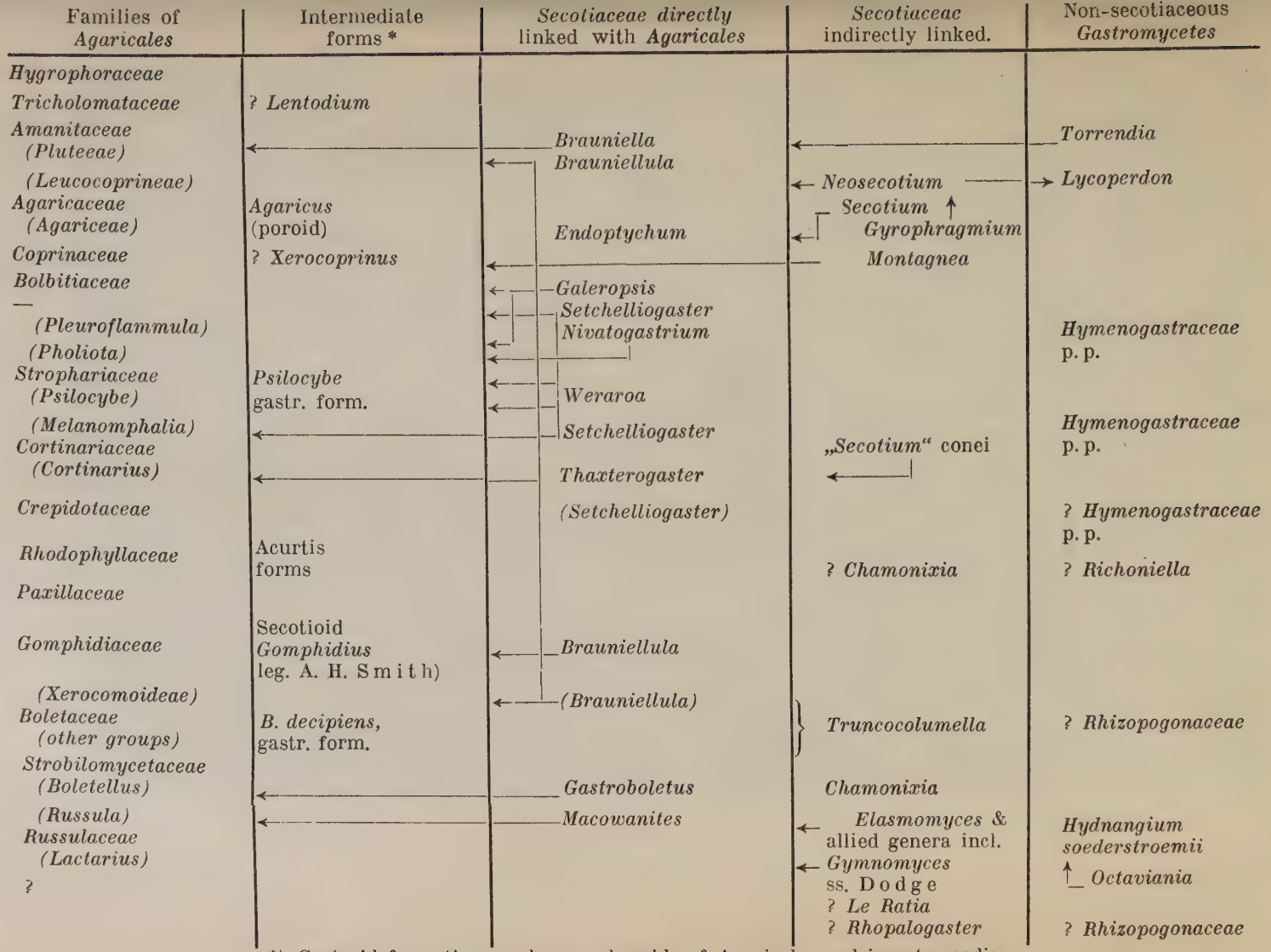
[7]) Unfortunately, even as quotations, the literature cited by Martin does not indicate what Martin states. Heim (1931) does not show that *Galera besseyi* was a gastromycete derived from *Galera* inasmuch as the species he calls *G. besseyi* (in reality not conspecific with the North American species) was described by him in a new subgenus *Cyttarophyllum* of *Conocybe,* an agaric. Velenovsky (1930) had not, independently, come to a similar conclusion since he did not comment on the position of the genus *Galeropsis* and, even less, on the phylogeny of this genus. The first author who recognized *Galeropsis* as a secotiaceous gastromycete was the writer of these lines (1936) when he — also for the first time — gave credit to Heim for his general statement regarding the affinity of some ocher-spored agarics with certain *Gastromycetes,* which had been shown to be correct through the example of *Galeropsis* as studied by Singer. Heim has actually linked what he considered a subgenus of *Conocybe (Galera)* with Podaxaceae or *Secotium,* an approximation where precisely the gastromycetous *Conocybe*-like link was missing. The fact that Heim later, much after my contribution recognized *Cyttarophyllum* (Heim) Sing. to be a synonym of *Galeropsis* and thus as a Gastromycete („agaricoide") cannot change the historical sequence of things.



*) Gastroid formations and carpophoroids of *Agaricales* and incertae sedis.

ancestors can in the long run scarcely be of much use to the authors who prefer such hypotheses since the links become gradually more numerous (see table 1), and the still un-linked families may conceivably be linked secondarily — i.e. from inside the *Agaricales*. The interpretation of a laboratory experiment can only be given in correlation with facts observed in nature. If environmental factors induced the start of several phylogenetic degradational lines towards gastromycetous habit and development patterns, the supposed beginnings of such a trend in nature must have produced gastroid forms and carpophoroids together with normal agaricoid fruiting bodies at the same place according to certain (apparently light) conditions prevailing at certain times. This would assume a better adaptation to certain conditions on the part of the secotiaceous forms than on the part of the agarics. Since we know now that the *Secotiaceae* (e. gr. *Weraroa*) which — according to this way of thinking — would have evolved from a *Psilocybe* like the one studied by McKnight are neither hypogeous nor xerophytic, but on the contrary, more hygrophilous and generally lignicolous, the value of these cases as demonstration of a first rise of gastroid fructification by failure of hymenophore exposure, callapses. Many agaricologists will also be aware of the fact — from direct observations in field and laboratory — that diseases (other fungi, bacteria) can lead to a failure to open up. And such carpophoroids as those of *Acurtis giganteus (Rhodophyllus abortivus)* are not adaptations since they are either sterile or show reduced fertility, yet occur so regularly together with the „normal" agaricoid fruiting bodies that the existence of the carpophoroids is actually a character by which the species can be recognized in the field. The same is true for the carpophoroid, less regularly found, of *Boletus rubricitrinus,* which corresponds perfectly well with that of *Boletinus decipiens* except that the latter is fertile, the former sterile. All these facts are available for study by those unfamiliar with them, yet, it would be futile to ignore or misinterpret them in order to maintain a prejudice.

The behavior of the carpophoroids and the atavistic aberrations of *Psilocybe* are not as extraordinary phenomena among fungi as may be assumed. The capacity of some *Basidiomycetes* and *Ascomycetes* to reproduce sexually is often exclusively laboratory-induced and there is no indication that these forms are produced as phase of a regular life cycle under natural conditions, where asexual spore production is the only one known. Apparently, some gene-controlled functions are inhibited by other functions whose artificial suppression will bring the inhibited function to the surface; or else a minor mutation — loss of one gene — may lead to aberrations, often useless and wasteful, that appear as a reconstruction of an ancestral function (or lack of one). It seems to me that this way of interpreting

phenomena of similar patterns is much more realistic than the illusion of having nature demonstrate, before your eyes, just how she has evolved to produce the Secotiaceae, or, for that matter the *Ascomycetes* (starting from *Hyphomycetes*), etc.

A further dogma of the degradationalist theoreticians is the gradual transformation of the morphology and function of the spore producing apparatus, the basidium-sterigma-spore configuration. If a single gene can regulate the transition from the agaricoid type of spore production with discharge to the gastroid spore production without discharge, it must be assumed that the same can be achieved in the reverse direction, i.e. by a single mutation. The stimulus favoring competition would be, in one case, dropping of an apparatus which has become useless, while in the other direction it would mean acquisition of an apparatus useful for spore-discharge and spore dispersal under conditions of hymenophores constructed so as to allow for free escape of the spores, or autodeliquescence. If it is permitted to think that this happened independently at several points of the ramified *Agaricales* system, it is also permitted to think that it happened more than once in different genera of the *Secotiaceae,* with reversed direction. However, this whole reasoning may be something of in oversimplification. The gradual transformation in some cases, and the incomplete transformation with a high degree of variability maintained in the gastroid forms, seems to point at a different possibility. There would indeed at first occur the omission of the drop of liquid formed in the Agaricales at the inner suprahilar region, then the sterigmata would straighten out and become more strictly apical, and the spores would at first still be eccentrically attached with an oblique hilar appendage which would eventually become straight and the spores axially symmetric. All this would happen in such a manner as to allow for the coexistence of different configurations in a single species or genus, often on a single basidium. This would happen not only in genera still close to the *Agaricales* but in such genera as *Torrendia* where the spores are by no means all symmetric and the sterigmata all gastroid but some sterigmata are less apical than others and these more than others show a tendency to be recurved to a vertical position and the spores arising from these might be eccentrically attached. This gradualness of development and variability of configurations makes it improbable that one loss of a gene regulates the whole process, and we may assume that the transformations after the initial loss of the capacity for discharge have been separately induced. But what is the biological basis of such an inducement? Is material to be saved, competition made more effective? An oblique hilar attachment of a globose spore as still seen in many *Gastromycetes* which have evidently no capacity of discharging basidiospores, does not seem to be a handicap of

any sort. Looking at it, however, from the opposite point of view, we assume an originally inherited instable and somewhat variable basidium-sterigma-spore-configuration, not the loosening of an originally stable condition.

We do know that the *Lycoperdaceae* are related to the *Secotiaceae* (as we have mentioned above), and we know likewise that the *Tulostomataceae* cannot but be related to the *Lycoperdaceae* in spite of differences in the spore production. It must therefore be assumed that at a certain early stage of basidial evolution in the *Gastromycetes,* the apical position of the sterigma was not at all a fixed one, and the somewhat lateral sterigmata had a tendency to curve up. It is also possible that in certain *Gastromycetes,* in contrast to the *Agaricales* and the majority of the *Aphyllophorales,* basidia are frequently in a position so as to produce the sterigmata on the upper side (in the sense of away from the earth) which in the case of large heavy-walled spored which do not separate early could have induced a bending of the sterigmata (a hypothesis which might be considered not improbable since in the *Secotiaceae* the sterigmata are not always either straight or bent half-sickle-wise inward, but at times one or more of the strigmata are bent outward), a position which might have become stable through later adaptive compensation through reinforcement of the sterigma walls in a later stage of the sporulation process. A further inducement to curving may be seen in the fact that, in many *Gastromycetes,* the loculi or veins covered with the hymenium are at least in some portions of the carpophore so narrow that the long-straight-erect sterigma of the „typical" Gastromycete would interfere with its opposite hymenium; anyhow, less space needed through lowering of the spore in acystidiate forms would make it possible to achieve earlier maturing, and earlier maturing would necessarily take place in smaller cavities.

It is difficult to tell which of the three suggestions correspond to the historical reality of evolution in the *Gastromycetes,* but it is rather obvious that the curving of the sterigma is not necessarily to be considered a „hangover" of the free spore discharge mechanism in the *„Hymenomycetes".* But once originated by whatever the reasons, the curved sterigma will eventually become the „sine qua non" of free spore discharge in the *Agaricales.*

The spore development is closely linked with the shape of the sterigma, inasmuch as a mechanical explanation of the evolution of the shape of the latter would likewise take into consideration the fact that a spore, at maturity, whose longitudinal axis continues the direction of an oblique sterigma, will exercise a far greater tension upon the sterigma wall (in those cases-characteristic for *Gastromycetes,* when the basidium is not horizontally extended) than a spore recurved so that its axis becomes parallel with the axis of the basidium.

Furhermore, the denser the hymenium becomes in the highest forms of the *Secotiaceae,* the less mutual interference in sporulating basidia may be expected if the spores are recurved which will of necessity make them axially asymmetric or rather heterotropic.

If, then, the half-sickle-shape of sterigma and spore asymmetry are both chracters which may very well have arisen directly from a selective process deep in the gastromycete ascendency — and, it would seem, have done so not only possibly, but probably (since in *Torrendia* and other „true" *Gastromycetes* spore asymmetry and curved sterigmata do exist) — it would seem that only one step more is now needed to produce an agaric according to definition, i.e. a highly developed Basidiomycete which, in contrast to its ascendants has the capacity to discharge spores by separating them from the tip of the sterigmata by a certain force so that, if the pileus is placed on a horizontal surface a spore deposite is formed (the „spore print"). The constant and decisive difference between a secotiaceous Gastromycete and an agaric or bolete is the incapacity or capacity to deposite a spore print.

The capacity of producing a spore projection from the sterigma-basidium complex depends apparently on two conditions: (1) the sporulation time must be postponed (2) spore fall must be possible, i.e. the hymenophore must permit free spore fall to the outside at the time of maturity. The first of these conditions can occasionally be observed in the *Secotiaceae,* for example in *Macowanites americanus.* The second is often naturally present even in a relatively early stage of evolution. At any rate, it must exist in order to produce an agaric or bolete. Wherever these conditions are realized, only one, and this time a physiological — change is needed to make the virtual agaric or bolete a functional agaric or bolete. The biophysics of the phenomenon of spore discharge in agarics has not been studied sufficiently as to speculate on the conditions under which the exudation of the watery droplet at the suprahilar region of the spore (when still attached to the sterigma) takes place or under which conditions the osmotic forces act in such a way as to forcibly project the spore.

It is idle, at present, to theorize whether the exposure of the sporulating hymenium to the outside and its brusquer temperature and moisture changes, and/or the predominantly horizontal position of the basidium and/or the more advanced age of the fruiting body at the time of sporulation of the agaric have anything to do with this physiological change, and in which way.

It is then by a selective process, perhaps slow and little uniform, that we visualize the beginning of the anatomical-morphological basis of he spore discharge apparatus, still well within the Gastromycetes. The basidium will finally, by the logic of necessity, become stabilized in a constant and uniformly „hymenomycetous" type of

development, and this will cause the same to happen to sterigma and spore. The final, most important step is dependent on a certain characteristic development of the overall morphology and ontogenesis of the carpophore, and where this is realized, a single mutation, physiological rather than morphological, will create the first agaric in the proper sense, i.e. not a morphological agaric as *Macowanites* or a morphological bolete like *Gastroboletus,* but a spore-shedding agaric like *Russula* or a spore shedding bolete like *Boletellus.*

This step-by-step progressive evolution of the basidium-sterigma-spore configuration and its development from basidiole to spore separation coincides in a reversed direction with M a l e n ç o n's four-step „regression", except that the last phase, the globose *Sclerogaster* spore is not taken into consideration since we do not believe that the spore form is anything but a character of a definite line of evolution such as the astrogastraceous series, but not an integral part of any generalized evolutionary trend.

The foregoing hypothesis is the logical one to assume in order to explain the facts actually observed, facts that cannot be explained by the degradationalist school, or, in some cases, at least not any better. The theory which includes the thesis of ascendance from *Secotiaceae* to Agaricales does not, by any means, stand or fall with the correctness of this hypothesis. Furthermore, the hypothesis of sporogenesis evolution just developed above is not the only one which might possibly explain the facts supporting the ascendance theory. But at the present moment it seems as good a thesis, taken separately, as the thesis of regression in spore production types advocated by the degradationalist theory.

Our thesis covering sterigma-spore evolution has, moreover the great advantage that it starts at a point of evolutionary flux and instabilitiy which may logically lead to many types of basidial development, including the obviously highest — achieved in the Agaricales, white H e i m and M a l e n ç o n are handicapped by the manifest improbability of a basidium already stabilized from the primitive *Homobasidiales* upwards all through the *Aphyllophorales* and the *Agaricales* — far beyond the point where an instability is still demonstrable (as in *Tremellodendron* and related holobasidial groups) — only to degenerate into a new and repetitive instability in the „degraded" gastroid forms. By the time the „hymenomycetous" holobasidial basidium-sterigma-spore configuration, basically constant while passing through the evolutive process of two orders (always according to degradationalist theory), has reached the level of angiocarpy in the *Secotiaceae* and hymenogastraceous relatives of the latter, it is described as not only changing fundamentally to become increasingly „gastromycetoid", but it also falls back into types long since overcome, for example the up to 8-spored basidium in

several of these fungi, and even the stichobasidium (in *Alpova*). To propose this thesis is, in my opinion, asking too much of the imagination of the mycologist. On the other hand, if we assume that in two separate but parallel cases the *Basidiomycetes* have passed through an initial phase of basidial instability in morphology and function, in a gastroid main branch as well as in a hymenomycetous main branch, and early in the former a further development towards the agaric basidium and sporulation type has taken place, we avoid trying the sense for the probable and remain in agreement with theory as well as facts.

III. Arguments in Favor of Ascension from the Gastromycetes to the Agaricales.

At this point — after having discussed the main contentions, as I see them, of the degradationalists — their and the opposed theory are perhaps on an equal footing, at least as far as we may go with rational means rather than with quoting of authorities or intuition.

But from this point onward, I propose to submit a number of additional arguments — some of them perhaps not strictly new, but not before made part of a concerted effort to interpret the facts observed in the *Secotiaceae* studies — which, taken isolatedly are not very persuasive, but taken as a whole should not fail to convince the unprejudiced that a certain amount of preference, arrived at by careful weighing of all the arguments, belongs to the view that the Agaricales are descendants of *Gastromycetes,* mostly *Secotiaceae.* This does not by any means im ply that Lohwag's theories on morphology and the whole of his views on veils and on the homologies of Basidiomycete structures should be accepted. It should also by no means imply that B r e f e l d or B u c h h o l t z were reasoning in a similar way as the modern authors, and it shall not be denied that for example M a l e n ç o n who has added a great deal to our knowledge in this field as early as 27 years ago, has actually given proof of very astute judgement. If we name the mycologists just mentioned we merely wish to identify, by their names a certain trend of phylogenetical thinking.

1. T a x o n o m i c a l a p p r o a c h. Taxonomy can teach us a number of things about the probable direction of the evolutionary trend. Since conclusion of the studies on secotiaceous fungi by S i n g e r and S m i t h, we are in the possession of new data which throw a new light on some of the issues. For example, one would justifiably expect a line of degraded units starting from certain points of the *Agaricales* system to remain within, at least, the pattern of the family, if not the genus from which they supposedly originated. If the projections of Agaricales groups into the *Gastromycetes* — such as a

degraded descendant from the *Bolbitiaceae* — is actually discovered, not once but twice, and shows characters not only of the *Bolbitiaceae* but of neighboring families, one is led to believe that what really has taken place is rather the development of a line of units leading from one intermediate position in the gastroid sphere to two recent taxa in the *Agaricales.* Concretely speaking, *Setchelliogaster tenuipes* has the external peridial layer of vesiculose elements which may be expected to be transformed, in the course of further evolution, into the hymeniform epicutis consisting of vesiculose bodies characteristic for the *Bolbitiaceae;* yet sporal ornamentation is of a type not found in the *Bolbitiaceae* but in the *Crepidotaceae* and *Cortinariaceae,* especially *Melanomphalia. Truncocolumella citrina* has a hymenophoral trama intermediate between the *Phylloporus* type of bilateral trama and the *Boletus* type. Thus, it becomes more probable that *Truncocolumella* is the common starting point of two subfamilies (*Xerocomoideae* and *Boletoideae*) than it is to assume that after having originated from either *Xerocomoideae* or *Boletoideae,* it has then changed so as to resemble the opposite type. *Endoptychum* is apparently a genus which during further development toward the *Agaricales* splits into a group we identify as the *Agariceae* and another which comes closer to the *Lepiota-Leucocoprinus* type. *Galeropsis,* strongly reminiscent of habit and spore characters of the Conocybes and Bolbitii has the peridial characters of an aberrant type such as would seem to correspond to a representative of the *Pholiotoideae (Strophariaceae)* rather than of the corticated Bolbitiaceae. *Brauniellula* is not merely close to *Pluteus* but may also be transient to *Gyroporus* and certainly is related to *Gomphidius.* Of course, we are always free to answer by claiming convergence — whatever this might mean in cases of this kind — but when „convergence" becomes as common as in the case of the *Secotiaceae,* the chances are that we are dealing with affinities rather than with convergence.

2. Statistical approach. In every reasonable, acceptable phylogenetic scheme, we will find that in the majority of the cases, representing the rule as against special and unusual cases, two genera in juxtaposition, with evolutionary lines linking them directly, one with the other, it is generally the smaller one (in species) that gives rise to the larger with the latter being richer in races, microspecies, transitional forms, recent speciation, and making the impression of an assemblage of closely allied units in evolutionary flux and active evolutionary processes. This is valid for fungi as well as for other plants, and the animal kingdom as well.

In the *Secotiaceae,* we find generally well defined small genera with the species not numerous and well separated from each other by strong hiatus. The number of individuals is generally not impres-

sive, and on an average inferior to the most representative species of the corresponding genera of *Agaricales* which give us the impression of being at least partly of very recent origin. A comparison of good taxonomic treatments of *Setchelliogaster* and *Galeropsis* on one hand, and *Conocybe* on the other will prove the point. In table 2, some omparisons are made on a numerical basis.

Table II.

	Number of species *)	Infraspecific units **)
Montagnea	2	0
Coprinus & *Pseudocoprinus*	(200)	Many
Weraroa	4	0
Stropharia, Naematoloma, Psilocybe	38 (175)	Many
Nivatogastrium	1	0
Pholiota	33	Many
Setchelliogaster and *Galeropsis*	14	0—1
Conocybe and *Agrocybe*	15	Many
Thaxterogaster	6	0
Cortinarius	(400)	Many
Brauniella and *Brauniellula*	2	0
Volvariella and *Pluteus*	170	Many
Truncocolumella	2—3	0
Xerocomoideae, Boletoideae	113	Many
Astrogastraceous series	16	4—5
Russula and *Lactarius*	281	Many

3. Age and area. The „age and area hypothesis" is not a law that can be applied blindly in any given case, yet it is a rule for guidance which will hold true if used "cum grano salis", with a view on as large a number of phylogenetically significant aspects as possible. Genera with a nearly world-wide distribution are in principle more ancient than genera with compact though restricted areas if both are part of an evolutionary line. And as the large areas contract, they often become widely disjunct, and the pattern of disjunction may give interesting indications as to the flora the particular element belonged to. Specifically, *Thaxterogaster* still has an extremely wide area including Patagonia, New Zealand, Australia, and parts of North America. The disjunction between Patagonia and New Zealand which is in accordance with the area disjunction also observed in its geobotanical partner, *Nothofagus,* points unmistakably to its pertaining to the ancient Austral-Antarctic flora, and the minimum age can practi-

*) Figures adapted from Fischer (in Engler & Prantl), Singer (*Agaricales*) and other sources supplementary to these, or Ainsworth & Bisby (in parentheses)..

**) Estimated from available monographs.

cally be dated for the species of the Southern Hemisphere. On the other hand, *Cortinarius,* even though well represented in the areas of *Thaxterogaster,* is represented by a particularly large number of species (usually the largest single element in the flora) in those regions where a recent immigrant flora dominates. *Gastroboletus boedijnii* was found in a region with a flora notorious for numerous „living fossil" elements. *Galeropsis* — as many of the xerophytic fungi (and plants) — has still an almost universal occurrence although its representatives are rare and restricted to very definite habitats. *Brauniella* and *Brauniellula* with their widely disrupted area seems to have passed the point of general occurrence which its descendants, *Volvariella* and *Pluteus* are now gradually beginning to conquer. *Elasmomyces* and *Arcangeliella* apparently wiped off the cis-alpine Central European plains, is still found rarely in Italy where the ice age has not been able to reach it, and is likewise found in the Moscow area where it might have been able to return since the lack of east-west mountain ranges permitted it to retreat and progress freely according to the climatic conditions. *Russula* and *Lactarius,* on the other hand, are now widely distributed and apparently in progress; moreover they are favored by forestation and follow the pine plantations into the tropics, Australia, and South America. Even more pronounced is this contrast in the case of *Truncocolumella* vs. *Boletaceae.*

3. The anatomical approach. The finer structure of hyphae and spores is often indicative fo the direction an evolutionary trend has taken. In the *Basidiomycetes,* Kühner has shown — and I do not believe that there are any dissenters — that the presence of clamp connections, where opposed to phylogenetically related groups without clamp connections, always indicates that the clamp-bearing group is relatively more ancient. Once the clamp connections have been lost completely, as in the entire family *Russulaceae,* there cannot be any possibility — without violating the law of irreversibility — to proceed to further descendant groups which again have clamp connections. Consequently, in the elaborate line of degraded genera leading off the *Russulaceae* in Malençon's scheme, a line generally called the astrogastraceous series, it is to be expected that all the genera remain clampless. This is actually the case as long as we are dealing with the first immediate steps of so-called degradation, i.e. *Elasmomyces, Arcangeliella,* etc. are consistently clamp-less as far as I could ascertain. However, precisely where we come to the terminal points of the series, in *Hydnangium (Hydnangium carneum* and *soederstroemii*) clamp connections were again encountered by me. The same reversal of what the degradationalist would expect again appears in the neighborhood of the boletes. *Gastroboletus,*

related to *Boletellus,* is clampless, just as all species of *Boletellus.* But *Truncocolumella,* one step further removed from the boletes, has abundant clamp connections (some taking the shape of medallion clamps). In the series leading from *Secotium* to *Neosecotium* and to *Endoptychum,* we find abundant clamp connections in the still far removed genus *Secotium* (volvate, gleba without sublamellar structure), some few in the genus *Neosecotium* which has gone one step further toward both *Leucocoprineae* and *Lycoperdaceae* according to the detailed comparative studies by Singer & Smith, and finally no clamps at all in *Endoptychum* in general as well as in *E. depressum,* the species so distinctly related to *Agaricus.*

Here again, these in my estimation very pertinent and important facts may be explained away by claiming that *Endoptychum* and *Neosecotium* as known today are only side branches of the main line leading to the *Agaricaceae* which may have had preserved their clamp connections and lost them only after reaching the agaricoid level. As a matter of fact, such a possibility exists inasmuch as we do not for a moment imply that the recent representatives of the *Secotiaceae* are themselves the actual ancestors of the respective agarics, and considering furthermore that there are some *Agaricaceae* which still have clamp connections (although it is only a small minority), a clamped series of ancestors may have to be assumed. But this does not remove the significance of the trend shown by comparison of *Secotium-Neosecotium-Endoptychum-Agaricus,* and the coincidence of parallel trends in the *Truncocolumella-Xerocomus-Boletus* series, and most convincing, the astrogastraceous series, cannot be brushed off lightly.

In the other groups, the existent data are insufficient or else, and this is the majority of the cases, the entire series maintain their either clamped or non-clamped condition throughout as might have been expected in the first place. This goes so far that the species of *Thaxterogaster* most related to the clamp-less minority of *Cortinarius* subgen. *Myxacium* are likewise clamp-less while the rest possesses clamp connections. But while all secotiaceous ancestors of the *Bolbitiaceae* have clamps, many species of the *Bolbitiaceae,* particularly *Bolbitius,* have none.

A less significant means of ascertaining the trend of evolution is the presence or absence of a germ pore. It is generally assumed that the possession of a germ pore is a sign of additional differentiation of a spore. It would therefore appear that the germ pore is either maintained where originally present, or remains absent throughout a series of related genera, and if any change should take place, it should take place in such a form as to allow the more evolved form

to be the one with, the more primitive form the one without a germ pore. If we pass revue of the various series that interest us here, it becomes clear that the germ pore, where present, is maintained in both directions, and only one case is known where a gastroid genus is composed of primitive germ-pore-less species as well as species with germ pore. This is *Galeropsis*. Since it is true — assuming a relationship between all *Galeropsis* and all *Bolbitiaceae* — that there are two species of *Agrocybe* without a germ pore, this fact as observed by me on *Galeropsis allosperma* may not be forceful enough to be lined up together with the argument based on clamp connections.

4. The organographic approach. If it is permitted to use the word organographic as a heading for a study of comparative morphology of the loculus or tramal chamber, it may be said that the organographic approach has been used by this writer for many years in order to show that the transition from a loculate gleba into a sterile trama can lead to the formation of spherocyst nests. But the following lines are not a mere repetition of statements based on Lohwag's hypothesis, but based on recent observation of the structure of the tramal plates in astrogastraceous genera, in *Nivatogastrium, Setchelliogaster,* and even such remote groups as the Rhizipogonaceae. It has become clear to me that a common hymenophoral structure in the Hymenogastraceous and secotiaceous fungi shows a regular mediostratum accompanied on both sides by a layer of inflated hyphae transient into spherocysts, and this layer gradually becoming smaller (or rather as its elements develop, becoming larger in the older interior strata) and taking the place of a subhymenium from which eventually the basidia (and very commonly the pseudoparaphyses as hymenial outgrowths of the spherocyst-layer) are formed. Assuming now that under the pressure of a heavier development of the pileus trama vs. the thin gastroid peridium, the uppermost loculi are suppressed in favor of the glebal portions that will become free in the lower portion of the hymenophore, the uppermost loculi will be sterile and if allowed to develop to the point of forming the vesiculose lateral-stratum-subhymenium, a nest of spherocysts will be formed. Such sterility of the loculi near the peridium becomes more than an assumption if we remember that these are the ones that do not sporulate in *Gastroboletus* when the lower portion of the gleba has already passed the peak of sporulation. Driving this process a little further, the immature loculi will not have a chance any more during the life time of the fruiting body to develop spores at all, and will finally not develop basidia, or the basidioles will early be transformed into or replaced by pseudoparaphyses which, as we have seen in their origin, are merely hymenial spherocysts and will thus become another

type of endocystidia[8]). While it may appear from Malençon's account of the situation in the astrogastraceous series that the spherocyst nests of *Russula* are gradually lost after they had unaccountably appeared in that genus and *Lactarius,* we know now that the heteromerous structure of the trama is not anything quite special in the *Russulaceae* but is not even a phenomenon restricted to the *Agaricales.* In certain species of *Rhizopogon,* the peridial trama, quite obviously under the influence of the same transformations described above for *Elasmomyces-Russula,* is also forming sterile spherocyst nests, not only hymenium-less chambers but chambers completely filled in and solid with spherocysts exactly as in *Russula.* With this, I believe, the spherocyst nests of the *Russulaceae* have been satisfactorily explained. On the other hand, it will be up to the degradationalists to show that in one case a degraded line is losing the same structure which, in another, is formed not in the *Agaricales* but on the gastroid level, far removed from the Agaricales.

5. Developmental approach. In the comparative study of developmental types in the *Secotiaceae,* we are still in the beginning of a rational assemblage of dependable facts. Unfortunately, few species have been studied, and even those not always in sufficiently young primordia. There are two publications which seem to us of significance. One is the development study of *Secotium* carried out by Conard and actually dealing with what we now call *Endoptychum agaricoides.* We have already pointed out that *Endoptychum,* especially *E. depressum* and *melanosporum,* is the genus leading directly to *Agaricus,* and that *E. depressum* has not only the odor and taste but also the chemical reactions of *Agaricus,* section *Arvenses.* It is therefore not surprising to find that Conard's study of the development of *Endoptychum* finds complete agreement with what had been described by Atkinson for two species of *Agaricus.*

More significant for our present purpose is the fact that Cunningham, in his development study on *Weraroa erythrocephala (Secotium erythrocephalum)* observes that in the youngest stages a process of continuous and progressive carving-out of more cavities destined to become loculi is taking place in the direction toward the peridium. This is in complete agreement with my own observation regarding *Gastroboletus turbinatus* where, as indicated above, new chambers are continuously formed in the direction toward the upper portion of the gleba, not toward its lower margin. This continuous growth of the hymenophore is somewhat comparable with the

[8]) This approach might also explain the *Amanita*-structure in many *Amanitaceae,* Cystidia of the *Brauniella* group buried in the trama as remainders of abandoned chambers would look — and do look — exactly like the swollen terminal bodies of tramal hyphae.

indefinite hymenophore which keeps developing further and further in some *Aphyllophorales,* and is in contrast to the pre-definition of the hymenopohre as generally observed in most *Agaricales,* and certainly in those from which *Weraroa* and *Gastroboletus* are supposed to be derived. This would suggest that on the contrary, the indefinite extension of the hymenophore into the peridium trama is a remainder of primitive Gastromycete development and makes place to predefined hymenophore only as the agaric-bolete level is reached. This is logical since the relative position of the hymenophore is now of more importance than its extension in order to use all available interior space for reproduction purposes.

It has been said that the pseudoangiocarpous development of some *Boletaceae* and *Russulaceae* is actually merely a subtype of gymnocarpous development (it is just that in Reijnders' scheme of developmental types) and as such does not link with the angiocarpous secotiaceous ancestors. This opinion does not take the facts into consideration but starts from easy text book generalisations. It is neither true that all non-gymnocarpic Russulae and boletes are pseudoangiocarpous. Especially as far as the boletes are concerned, I am inclined to believe that not only *Strobilomycetaceae* are hemiangiocarpous, but also some species of the genus *Xerocomus,* and probably others. Secondly, pseudoangiocarpy merely reflects an ancestral stage of pseudoendocarpous[9]) development, and the initial exposed position of the layer that is to form the hymenium will — as I have pointed out in 1936 — find its appropriate explanation in the fact that some hymenogastraceous species such as some Gautierias begin, according to Fitzpatrick, their development likewise with an external hymenial structure. The development of *Hydnangium carneum* is similar. This, in turn, would suggest that the original ancestors of such forms might have had at least a tendency to early gymnocarpy. But I shall come to that aspect later.

It is furthermore another text book fiction that *Gastromycetes* fail to open the peridium except to form defined or irregular outlets for the spore powder as in the Lycoperdaceae. As a matter of fact, many secotiaceous fungi break off the stipe-columella in a relatively early stage, sometimes even before the first spore maturation and expose the gleba from below, often assuming the shape of a pileate agaric or bolete. This is so much so that even Fischer, undoubtedly one of the finest specialists of the Gastromycetes, doubted whether *Gyrophragmium* and *Polyplocium* do not rather belong in the Agaricales because of this behavior.

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[9]) I have proposed this term for a type of gastromycetous development corresponding to agaric pseudoangiocarpy, and differing in that the spores mature in the closed phase.

What has been lost sight of is the fact that the sporulation before hymenium exposure is only one, and often a relatively little impressive feature of gastroid development. A very important and thus far neglected factor is the inability of spore deposite production. The Gastromycete refuses to give a spore print under whatever optimal spore discharge conditions offered. This criterion puts *Macowanites, Gastroboletus, Montagnea, Gyrophragmium, Longula*, and *Polyplocium* undoubtedly among the *Gastromycetes* even though their type of development cannot but be compared with hemiangiocarpy [10]) as observed in *Agaricus* or *Strobilomyces.*

When we consider the rare gastroid aberrations of *Agaricales,* we shall note that the failure to open around the stipe-columella to form a pileus and expose the gleba does not impair the spore discharge mechanism; it only makes its functioning useless or impossible. What keeps the carpophoroids from complete fertility is rather the incapacity to form continuous expanding glebal chambers in the trama, following up the pre-defined hymenophore formation. In other words, if the hymenium is too embryonal when the carpophore has become adult, the sterile corpophoroid will result. Generally speaking, sterile corpophoroids must be expected in gymnocarpous agarics or boletes rather than in those having a closed phase in their development during which the hymenium matures. Further insistence on this subject would, however, take us to far from the subject of this essay.

6. Cytological approach. Cunningham has described the cytology in terms of the nuclear behavior of the basidioles, basidia and spores of *Weraroa erythrocephala.* According to him, four nuclei ascend through the sterigmata and enter the spores, one nucleus per spore. Provided that this observation is correct it would compare "unfavorably" with the pattern described by Kühner and others whereby the four nuclei start the third division immediately after entering the spores so that each spore has two nuclei before discharge, a type of nuclear cytology which, according to Kühner, is to be considered more highly evolved than that of the *Agaricales* producing uninuclear spores, particularly as seen in the *Tricholomataceae.*

Another indication referring to the cytology of these species and genera is Ruhland's work on *Hydnangium carneum.* But the extraordinary variability of nuclear migration toward the one or two sterigmata of each basidium makes it difficult to draw any other comparative conclusion than to emphasize the instability of the division and distribution of the nuclei.

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[10]) The term hemiangiocarpy would be more adequate in order to emphasize the fact that here — even though the hymenophore becomes exposed — hymenial exposure is not prerequisite of spore formation.

In all fairness, the cytological results are too sketchy and far between to be of great value as an argument in favor of the theory which derives the Agaricales from the Gastromycetes by way of the *Secotiaceae*. While one single observation seems to favor this view, others, at least, do not favor the opposite view.

7. The biological approach. By a biological approach, I refer to arguments of phylogenetic significance which are based on the biological processes of the respective organisms in relation to their environment. Such relationships may include the means of dissemination by wind, animals, etc., parasitic and symbiotic relationships, and mere substratum-specialization. This form of argument has always been an attractive form of approach, yet its yield is relatively small. The rodents have been invoked who, according to observations by Singer and others play perhaps a major role in the dissemination of the spores of some *Secotiaceae,* particularly the hypogeous ones. It would seem logical, to assume that the respective fungi could not be more ancient than the rodents which, as mammals, cannot compete with polypore relicts found in carbonic deposits and other early fossil-bearing material.

This field is of course dangerous. Although it does not result that the Secotiaceae are more recent than the *Agaricales,* it shows that they are definitely more recent than the *Aphyllophorales* — leaving the *Agaricales* as the innocent bystanders but implying, naturally, that the more ancient group — the *Aphyllophorales* — is more likely to be ancestral of the *Agaricales* than the supposedly relatively recent *Secotiaceae.*

The argument is, however, fallacious. In the first place, there are even now Secotiaceae which have no biological relations with mammals, such as *Galeropsis*; secondly there might have been any number and kind of secotiaceous fungi before some few representatives of that family adapted themselves in a loose and still rather independent way to mammal-distribution, and there is no reason to assume that the actual ancestral forms of the *Agaricales* did depend on rodents for survival. Furthermore, the comparison is somehow incomplete since nothing can be said about the Agaricales generally, and any question about the "age of the *Agaricales*" must remain unanswered at present. The palaeobotanical relicts of *Aphyllophoraceae* are restricted to some woodinhabiting larger and very resistent (woody) forms, and their occurrence in carboniferous strata proves merely that fungi are a very ancient form of life.

On the other hand, although still not fully conclusive (since parasitism may be a unique adaptation in a single case between exceptional species), parasitism seems to be more indicative as a biological factor of significance. *Nyctalis (Asterophora)* parasitizes

on *Russulaceae,* particularly *Russula-Nigricantinae*; *Xerocomus parasiticus* parasitizes on *Scleroderma,* and *Volvariella surrecta* on *Clitocybe nebularis* and *Cantharellus.* The latter example does not show much since both parasite and hosts are relatively ancient; but in the case of the second pair we have proof that at least parts of the genus *Russula* must have existed before the genus *Nyctalis* originated. In other words, it appears somewhat unlikely that the white spored *Tricholomataceae* and *Hygrophoraceae* had given rise to the *Russulaceae.* And in the case of the *Xerocomus-Scleroderma*-relationship it would appear that the primitive *Gastromycetes,* far from being an offspring of the *Boletaceae* and other Agaricales families, were ancient enough to offer themselves as hosts to *Xerocomus* species, or what others believe to be the origin of the *Gastromycetes.*

Nevertheless, here also, the deductions are not forceful since both the ancestral and the derived genera or families did continue to evolve and it cannot be denied that in the genus *Scleroderma* as well as in *Russula,* young side branches have been formed which participate very actively in the recent floras of this earth; thus we may also anticipate that it might be argued that both the respective parasites are merely very recent offsprings of a generally ancient family. Only the fact that the prima facie evidence in both cases points in favor of rejection of this explanation, will give it some limited value in the overall problem where it has to be weighed together with all the rest of the evidence.

It may also be attempted to bring up the question of mycorrhiza origin in the *Gastromycetes* or *Agaricales.* The contention that the relation with tree roots — undoubtedly existing in most hypogeous fungi — is a more primitive one *a priori* since the whole biological cycle takes place in the humus and where the root tips are, instead of showing a differentiation whereby an important part of the nutritional function is tied down to the root tips whereas the reduction division and spore dispersal takes place above the ground (as in the case of the epigeous mycorrhizal fungi), is a purely theoretical approach which does not provide any supporting facts. However, if some non-mycorrhizal gastroid forms could be shown to be close to some mycorrhiza-forming *Agaricales,* or vice versa, this would amount to an important argument in favor of one or the other theory. Unfortunately, this is not the case. Mycorrhiza is apparently maintained while evolution proceeds in all other regards, and it is not formed while organisms enter a degradation process or a phylogenetical ascent toward the Agaricales. The only case where such a possibility might have been realized is in the astrogastraceous series. *Hydnangium* may not or not always be mycorrhizal since it occurs in flower pots with usually non-mycorrhizal seedlings, and *Mac-Owanites* has allegedly been found under *Acacia,* also generally not

considered a (ectotrophic) mycorrhizal host. However, in my recent travels in Bolivia and Brazil, I have come to the conclusion that certain *Leguminosae* such as probably *Inga* might be ectotrophic mycorrhiza formers, and on the other hand, *Russula* is only thoroughly mycorrhizal for the mycologist limiting his observations to the temperate regions while in the tropics the suggestion has been made that most species might be linked either with *Sapindaceae* or *Leguminosae*, but this is not more than a suggestion which is difficult to disprove except by experiment.

All together, it may be said that the biological approach has, thus far, not yielded much forceful evidence in either direction.

8. Reductio ad absurdum. While the preceding discussions were aimed at a test to show which theory would gain by application of all the possible rules and methods of research, we shall now use the negative method of showing that the contention of the degradationists is not acceptable since they do not show a plausible way of deriving the Agaricales, after having rejected, arbitrarily, their origin in the *Gasteromycetes*. It is of course a crucial question whether any of those groups which are by some believed to become degraded to gasteroid stages could reasonably be derived from a "hymenomycetous" source. The important word here is the word "reasonably". It is undoubtedly possible to derive, on paper, almost any family from a "hymenomycete". Thus Heim has accepted a thesis, apparently going back to the year 1889, whereby the *Russulaceae* might be descendants from the *Hygrophoraceae*, or *Russula* from "*Hygrophorus*". Unfortunately, this thesis which at Fayod's time must have looked better than now, will just not be adequate, and any mycologist who has acquainted himself sufficiently with modern methods of study in these families, will hardly go beyond acknowledging that there are two species in *Russula* which look somewhat like *Hygrophori* but are far from being hygrophoraceous by any stretch of the imagination. Some authors have quoted the reddening Hygrocybes as being counterparts of the *Russulae-Nigricantes*, but here again, the similarity stops at some vague external similarity. Dennis has discovered and Singer analyzed a species with echinate spores belonging to the *Hygrophoraceae*. Yet, the ornamentation of that species is not at all comparable with the charcteristic spore ornamentation of *Russula*. While all Russulas have some sort of cystidia, only few *Hygrophoraceae* have cystidia of any kind, and those which have them have inconspicuous cystidia of a type very different from that of the *Russulaceae*. Even assuming that those groups of *Hygrophoraceae* that lack clamp connections are better classified within this family than in the *Tricholomataceae* — a conclusion which I have lately accepted and published as acceptable — the clamp-less

Hygrophoraceae are precisely the ones least similar in other regards to the *Russulaceae*; they have no latex; they do not turn red or black; they do not have cystidia; and they are not forming mycorrhiza. Furthermore, there is an abrupt change in one of the most basic characters in *Agaricales,* in the structure of the trama. In all *Hygrophoraceae,* the trama is homoiomerous, and in all *Russulaceae* the trama (and in most Russulas even the hymenophoral trama) is heteromerous. We have already discussed the origin of the spherocysts in the trama of the Russulaceae. They are certainly not comparable with and cannot be derived from anything seen in any representative of the *Hygrophoraceae.* Chemically, the amyloid external layer of the spores so characteristic for the *Russulaceae,* is absent in *Hygrophoraceae;* only in one thus far monomorphic genus of the *Hygrophoraceae* have spores of a banal amyloid type been observed. These spores have a completely homogeneous non-ornamented wall, and their type of amyloidity is the one generally seen in agarics (*Amanita, Cantharellula, Catathelasma,* etc.), chemically and structurally far removed from that of the Russulaceae. In order to tentatively support the degradationalists hypothesis — merely in order to exhaust all the possibilities — I have mentioned in a previous paper that *Melanoleuca* would fill the degradationalists's bill much better than *Hygrophorus.* Even so, the *Russulaceae* being the only family in the *Agaricales* with spherocyst nests in the pileus trama, it will be difficult to encounter a satisfactory ancestor for the *Russulaceae* in the *Agaricales.*

The same difficulty as is found in search of an ancestor for the *Russulaceae* — unless the astrogastraceous forms are admitted as such —, is also met in the realm of boletineous groups. Heim has repeatedly stated, without making his idea plausible, that the *"Boletales"* are polyphyletic and that for example *Gyrodon* [11]) has polypore ancestry. While it is possible that biphyletism could be shown for the boletes as a whole insofar as *Gastroboletus* seems to be ancestral to the *Strobilomycetaceae,* and *Truncocolumella* to the *Boletaceae,* it is completely removed from reality to claim a polypore connection of any kind for *Gyrodon.* N e u h o f f has once based his contention which also had to do with deriving boletes from polypores, on the non-existent white spored boletes which do seem to pop up from time to time in Agaricales systematics. The white-spored Gyrodons are a fairy tale; the white spored *Polyporoletus* turned out to be *Scutiger.* The white-spored *Boletus pyriodorus* turned out to be colored-spored *Tylopilus tabacinus* ("white-spored" only because M u r r i l l had

[11]) The situation is, if anything, worse for the pretended *Ixechinus-Fistulina* bridge. Singer (Sydowia **9**:421. 1955) has shown that *Ixechinus minus* is merely a species of *Tylopilus* (a homonym, if transferred) and that the tube-separation appears to be an artefact.

not obtained a spore print on white paper, and therefore claimed white spores for the species). There are no polypores with bilateral trama as *Truncocolumella* and *Gyrodon* have it; and the only fleshy polypores similar to *Gyrodon* are not colored-spored.There does not seem to be any formation of ectotrophic mycorrhiza in the polypores except probably in the *Scutiger*-group yet the *Scutiger* group is so different anatomically, chemically, in aspect, and in spore color that it takes as much imagination on the part of the mycologist to accept such an affinity as it takes to swallow the alleged affinity between *Hygrophorus* and *Russula.* In order to substitute again a better candidate for their needs, I offer the degradationalists the use of a bridge from the Boletaceae to the white-spored agarics and the "polypores" which they seem to have overlooked and which seems much more logical than the *Polyporus-Gyrodon* jump. I have several times had occasion to discuss the close relation existing between the Paxillaceae and *Gyrodon.* In the *Paxillaceae* I have placed two white-spored genera *Cheimonophyllum* and *Hygrophoropsis.* Although I personally do not believe that these two genera are very closely related with the *Tricholomataceae,* there are those who believe they are, and the totality of their characters makes it certainly possible, and a matter of individual opinion, at the present time, to argue in favor or against a closer relationship with some tricholomataceous groups. On the other hand, I have shown that the often pleaded affinity of *Polyporus* and *Lentinus* (with allies: *Panus, Pleurotus, Phyllotopsis* etc.) is anatomically demonstrable, but that not the *Lentineae* are part of the "polypores" but that *Polyporus* sensu str. (*Polyporellus*) with some satellites actually belongs to the *Agaricales.* I am not of the opinion that *Polyporus* sensu str. is in any direct or indirect way related and more than similar to the genus *Microporus,* yet if anyone needed a hypothesis by which a bolete should be linked with the *Aphyllophorales,* he might not hesitate to ignore the fact that *Microporus* is a *Coriolus* with a pseudostipe rather than an aphyllophoraceous projection of a *Polyporus* sensu stricto, and accept the bridge *Gyrodon-Hygrophoropsis-Clitocybe-Pleurotus-Polyporus-Microporus.*

After discussing the chances of the degradationalists to derive the gastromycete-near *Agaricales* from other *Agricales* or *Aphyllophorales* at this length, it might not be necessary to enter the question where *Volvariella* comes from if not from *Brauniella*; *Agaricus* if not from *Endoptychum; Cortinarius* — if not from *Thaxterogaster,* etc.

Instead, we may ask another question: If *Neosecotium* is sufficiently ancient to give rise, as we have shown it might have, to the Lycoperdaceae, would it not be slightly absurd to postulate that this general neighborhood — taxonomically speaking — is the result of repeated degradation starting at a point of the *Agaricales* system where a genus with numerous species difficult to classify, and

vigorously defending their place in nature, *Agaricus,* is itself only the end product of a long series of gradually more and more differentiated agaric-forms which, in turn, have passed originally through the entire *Aphyllophorales* system? It turns out, then, that with a general statement saying that deeply colored agarics are more highly developed than whitespored groups (because of a number of reasons), no sensible phylogenetic answer can be found. The fact that the white-spored groups *are* more primitive in certain respects than colored-spored families in these same respects may easily be explained by the possibility that both groups are the result of evolutionary lines running parallel after a near-common or perhaps only similar start, whereby a certain set of characters has become quickly elevated to a highly differentiated standard in the colored-spored families and their white-spored allies (such as *Leucocoprinus* and the numerous cases of white-spored relatives of dark-spored genera, and their spore-albinos) while another set of characters has been found to evolve more rapidly in the typical white-spored families such as the *Hygrophoraceae* and *Tricholomataceae* (to which we might have to add the family *Polyporaceae* sensu str.). There is indeed an extraordinary development to be observed in *Mycena* and *Marasmius,* particularly as far as host specificity, rhizomorph production, or an intricate system of sexual and propagula-dissemination (as in *Mycena citriceps*) is concerned, not to speak of the differentiation of distinct cystidial types and the almost unlimited adaptability of the sexual reproduction forms and cytological types. The transition toward such interesting adaptations as the production of conidial fructifications on parts of or the entire macro-carpophore (*Armillariella*) or the only case of transition from normal sporulation to bulbillosis (in *Amparoina*) are exclusively or predominantly phenomena observed in the white spored agarics.

This may be the time to place bulbillosis into a new light. The first step in this regard is, as is shown by *Amparoina,* a transfer of sporulation to a much earlier stage of the fruiting phase than usual in agarics. This is accompanied by a strong development of the subhymenium. Only on this basis is it possible later on to reduce the spore bearing time or skip it entirely while some of the subhymenial cells, now replacing almost the entire trama of the pileus or at least the hymenophore, become sclerotized and take over the role of the gonotocont. It is obvious that both early sporulation and a broad vesiculose subhymenium are traits, reminiscences in my way of interpreting them, of gastroid origin, more particularly observed in most Secotiaceae. This would indicate that agaricoid development is not so much a transition to earlier hymenium exposure as it is later maturation. At any rate, only the gastroid ancestry makes bulbillosis phylogenetically understandable.

Likewise, on the physiological level, it may be said that white spored agarics are not, as a whole, of lower organization or simpler than the ones with colored spores.Specialized symbiosis with plants (endo- and ectotrophic mycorrhiza) and animals (coexistence with termites, ants, in tropical Asia, Africa and South America) exist in the colored-spored and the white-spored *Agaricales,* but for that matter did exist in other forms (lichenization, symbiosis with scale insects) at a morphologically and — no doubt — evolutionarily low level in the *Aphyllophorales* (Basidiolichenes, some *Clavariaceae*; *Septobasidaceae*).

As for the spore color in agarics, wherever a parallel development is unthinkable, there seems to be as much evidence fo the white spores originating from colored ones (as in Agaricaceae, *Inocybe, Psilocybe*) as there might be for the opposite. I have not the slightest doubt as to these contradictory trends having been realized, both almost coethaneously, in many evolutionary lines or side-branches during fungus evolution.

With the discovery of *Endoptychum depressum* and the reevaluation of *E. melanosporum* by Smith and Singer (S m i t h & S i n g e r 1958), it might seem that in the *Agaricaceae* a trend from dark-spored to hyaline-spored genera leads by the way of pseudoamyloid spores and spore prints with a green tinge, an observation not without interest since it is paralleled by another hypothetical trend in the bolete-*Paxillus-Gomphidius* complex where those white spored agarics closest to *Paxillus* are characterized by frequently pseudoamyloid spores (*Hygrophoropsis*), and, within this complex („*Boletinaeae*") olive- spored groups are frequently encountered — an interesting phenomenon because of the fact that olive and greenish spores are generally rare in the Agaricales — except in these two cases. I do not know what significance it has — if any — that in the *Secotiaceae* and *Lycoperdaceae* (the latter to be derived from *Neosecotium*-like fungi [12]) both pseudoamyloid and greenish-olive spores are not unusual.

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[12]) The similarity of habit, the spore characters including the pseudoamyloidity and ornamentation, and the characteristic pigmentation of the spores — with lack of characteristic pigmentation elsewhere —, the ecological requirements and the carpophore development make it very probable that *Lycoperdon,* as we know the genus today, is a descendant of *Neosecotium,* a secotiaceous genus with very definite affinity with *Endoptychum* which in its turn, is demonstrably close to *Agaricus.* Both Heim and M a l e n ç o n have repeatedly insisted on the thesis that the *Lycoperdaceae,* among other gastroid groups, are completely isolated from the *Secotiaceae* and *Hymenogastraceae,* the so-called agaricoid *Gasteromycetes* of the degradationalists. The extraordinarily forceful demonstration of a link with one and the same secotiaceous genus on both sides, the side of the *Agaricaceae* and the *Lycoperdaceae,* should serve as one of the most important counter-arguments against the assumed hiatus between the

IV. Origin of the Gastromycetes.

Of course, a critical revue of the alternative possibilities may also be a method applicable in order to test the theory of those who derive the *Agaricales* from the *Gastromycetes*. The logical question in this case would be: Where do you believe the *Gastromycetes* originated?

The origin of the *Gastromycetes* takes us into the gray and indistinct past of fungus evolution without anything comparable to the bridging series, now at the diposal of the phylogenetic taxonomist in the *Secotiaceae-Agaricales*-complex. This problem is consequently much more difficult to answer than the hypothetical question regarding the origin of the *Agaricales* if they have not derived from the Gastromycetes.

While this is undoubtedly true, it does not mean that those who are in favor of deriving the *Agaricales* by an ascending line from the *Gastromycetes* would attempt to shirk the question.

It is my opinion — and here I speak about a pronouncement of a much vaguer status than my theory regarding the origin of the Agaricales — that there are among recent floras, hardly any species or genera which might illustrate what a really primitive Gastromycete looked like at the point of the origin of the *Gastromycetes* as an order or subclass. While illustrating the evolutionary trends and the traces they left in recent floras of the world, we may, as well as the degradationalists, safely refer to genera as representing as a whole (not necessarily any living species, or in the generic delimitation now accepted for the existing flora) a phase through which or by which evolution has passed. We may place the genera in our schemas in a certain distance from the corresponding genera of *Agaricales* wihtout being accused of the delusion that the taxa of the recent fungi are the actual ascendants of other taxa of recent fungi. However, this situation worsens, gradually but distinctly, as we ascend into the early phase of fungus evolution when the basic subdivisions of fungi first became differentiated.

It has become modish and sophisticated to say that the *Gastromycetes* as a natural taxonomic unit do not exist, that they are completely heterogeneous and break down or go back to a number of different sources. Classical Gastromycetologists were not of this opinion or were, at least, doubtful and openminded about such pronouncements. A group of plants may rightly and credibly be suspected of being heterogeneous only if at least a reasonably acceptable

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„true" *Gastromycetes* (which, in Malençon 1955, pl. 10, p. 124, include, side by side, *Lycoperdaceae*, and *„Torrendiaceae"* as *Endogastrineae*) and the agaricoid *Gastromycetes* or *Exogastrineae* in Malençon's terminology; in other words, the *Gastromycetes* are still phylogenetically-taxonomically a whole, and the *Secotiaceae-Hymenogastraceae-Phallaceae* are not separated from the rest of the *Gastromycetes*.

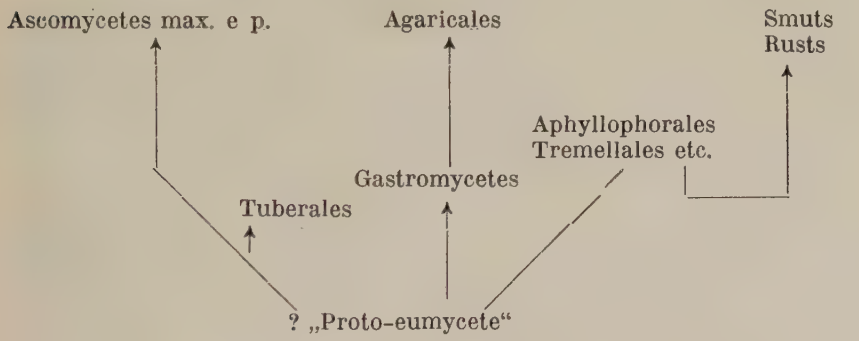
theory has been given which shows which other affinities besides the ones thus far assumed, might have some bearing on the phylogeny of such a group. In other words, admittedly strongly individualized groups with formidable hiatus separating them from the main group (or all other groups) of a large taxonomic entily like the Gastromycetes, cannot and should not be termed polyphyletic as a whole unless it is shown where the single main groups *did* originate. If we, like Malençon, derive several groups even within a — in my opinion homogeneous — family like the *Secotiaceae,* from starting points distributed all over the families of a neighboring order, we may very well speak about polyphyletic origin — to that extent. But Malençon has no plausible hypothesis and — if I understand his opinion correctly, no hypothesis at all about the origin of the „true" Gastromycetes of his scheme, i.e. the *Plectobasidii* and the other groups of gastroid forms which according to Malençon are not related to the Agaricales. Therefore, the claim that the *Gastromycetes* are heterogeneous and polyphyletic as a whole should be modified in the sense that they partly derive, always according to Malençon, from the Agaricales, and partly from some unknown source. Since, in view of the entire foregoing discussion and the play of probabilities involved, I reject Malençon's attempt to derive the *Gastromycetes* even partly from the *Agaricales,* I cannot convince myself that the Gastromycetes are necessarily heterogeneous and polyphyletic. There is merely the element of age: The origin of the various suborders constituting what is generally referred to as *Gastromycetes* is a very ancient one, and the bridging series of genera toward them is undoubtedly now partly extinct, partly so changed by further evolution that the respective forms are hardly recognizable as the original links or their relatives, particularly near the most primitive families.

Under the circumstances, it seems to me that the origin of the *Gastromycetes* must be sought in a hypothetic form which must be very close to the common origin of all *Eu-Mycetes* (*Asco-* plus *Basidiomycetes*). It seems probable that the first appearance of a gonotocont which forms spores externally should be expected to have occurred not at a time when its counter-part, the ascus had already become fixed and unlikely to give off, phylogenetically speaking, a new structure with external spore production, as would be the case if *Ascocorticium* were really the original source of the *Basidiomycetes.* Assuming, however, that, using Schindelwolf's terms, the basidium had arisen while the formative period of the gonotocont was still in the phase of typogenesis rather than later when the ascus had arrived at a stage of typostasis, we assume implicitely that this will also lead to a series of vacillating and diversifying tendencies concerning the basidium itself which continue all through the first phase of an aphyllophoraceous and a gastroid branch of which the

latter, after finally coming to a typostatic, „fixed" basidial type, the agaric-bolete-type, eventually reaches the level of the order *Agaricales*. On the other hand, having attained the state with exposed hymenium almost right away, the aphyllophoraceous type finally develops a similar type of basidium, which in its simplicity, and easy evolvement is inescapable, and actually becomes the rule where the higher chiastobasidial forms of the *Aphyllophorales* begin. This presupposes for the hypothetical „Proto-Eumycete" a tendency to form, possibly according to position or environmental variables, both an internal or an external basidial layer or basidium-producing layer, somehow indiscriminatingly and not genetically fixed as in later developments.

This is somewhat in contrast to my tentative acceptance in 1936 of the possibility of a derivation of the *Gastromycetes* from lower *Corticiaceae* which, in turn, might have come from *Ascomycetes* like *Ascocorticium*. This acceptance was merely the recognition of the existence of such a possibility as suggested before that by other writers, and has since been discarded as being just that, and not more than that: a bare possibility.

Table III.



Obviously a scheme as the one visualized by me here (see table 3), would lead to a certain symmetry between *Tuberales* on one hand, in the Ascomycete descendence, an the Gastromycetes on the other, in the Basidiomycete system. This, to me, explains better the certain similarities between the two groups, observed or compiled by Holm (1954) in order to show that the *Gastromycetes* originated with the *Tuberales,* than Holm's own thesis. If Holm were right, the acceptance of his thesis should almost automatically make the derivation of the *Agaricales* from the *Gastromycetes* still more probable to almost certain, yet, strangely enough, Holm himself did not realize this, and the arguments in favor of his thesis are not convincing enough although the suggestion is undoubtedly an interesting one.

This brings up for the second time the question whether the supposed derivation of the *Tuberales* from the *Pezizales* has any bearing on the question about the phylogenetic status of the *Gastromycetes*. In the first place, it seems to me that it is more probable to search for a common ancester of both *Tuberales* and *Pezizales* although I have to leave the details of this question to the specialists of the respective Ascomycete orders. But if the derivation of the *Tuberales* from the *Pezizales*, as mostly considered probable, should be verified upon further investigation, at least to the degree of probability to be expected in such questions, it would, in my opinion, not necessarily influence the direction of the evolutionary trend in the *Basidiomycetes*. While, in the *Basidiomycetes*, a tendence from gastroid to agaricoid in *Russula*, and coexisting with the first, another from agaricoid to gastroid in, e. gr., *Brauniella* seems to be unlikely in two almost parallel (yet reversed) branches, it is not difficult to imagine that at other occasions the trend might have been different, even opposite at different times, under different circumstances, and at different ends of the system of fungi.

Zusammenfassung:

1. Die Bedeutung der unzweifelhaft festgestellten Affinität zwischen den *Secotiaceae* und den *Agaricales* liegt darin, dass hier mehrere jetzt gut studierte Brücken zwischen beiden Gruppen Indizien über die Richtung geben können, die die evolutionären Strömungen im Pilzsystem genommen haben. Zur Zeit liegt kein positiver Beweis dafür vor, dass die *Secotiaceae* aus den *Agaricales* durch Degradation hervorgegangen sind, oder dass sie die Ausgangspunkte im System der *Agaricales* darstellen.

2. Dagegen kann gezeigt werden, dass die Argumente, die bisher für die Ableitung der *Secotiaceae* von verschiedenen Familien der *Agaricales* (durch Degradierung) ins Feld geführt worden sind, weder stichhaltig sind noch denen, die gegen sie angeführt werden können, an Wahrscheinlichkeitswert überlegen sind.

3. Andrerseits werden verschiedene Möglichkeiten die Frage zu lösen behandelt, unter denen besonders die taxonomische, die statistische, die Areal-und-Alter-, die anatomische, die organographische und die ontogenetische Methode wertvolle Hinweise auf die Entwicklungsrichtung in diesem Gebiet geben.

a) Die taxonomische Methode zeigt, dass durch ihre Stellung als Übergangsformen zwischen den Projektionen des *Agaricales*-Systems in die *Secotiaceae*-Taxonomie eine Ableitung der letzteren von den ersteren unwahrscheinlich ist.

b) Die statistische Methode zeigt, dass die mehr in Fluss und in aktiven Neubildungsprozessen befindliche Gruppe die der *Agaricales* ist, was sich durch Artenzahl und Varietätenzahl in jeder Gruppe durch Vergleich erweisen lässt.

c) Die „Age and Area Hypothesis" und weitere Deduktionen und Additionen im Gebiet der historischen Pflanzengeographie begünstigen

sehr deutlich die Thesis, dass die *Agaricales*, die irgendeiner Secotiazeengruppe nahestehen, älter sind als die abgeleiteten Agaricalesgruppen.

d) Der anatomische Hinweis auf das verhältnismässig grössere Alter der gasteralen Endglieder der evolutionären Ketten liegt ganz besonders darin, dass es möglich ist zu zeigen, dass schnallentragende Formen häufiger auf der Gastromycetenseite, schnallenlose auf der Agaricalesseite anzutreffen sind.

e) Durch die organographischen Methoden können wir zeigen, dass die Struktur von *Russula* und *Lactorius* nur dann zu erklären ist, wenn man annimmt, dass diese Gattungen von „Astrogastrazeen" (*Hydnangieae*) abstammen.

f) Ein Vergleich der Fruchtkörperentwicklung von *Secotiaceae* und ihnen nahestehenden*Agaricales* zeigt, dass diese Beobachtungen am besten erklärt werden können, wenn man die ontogenetischen Verhältnisse bei den letzteren aus ihrer Gastromyceten-Aszendenz heraus zu verstehen sucht.

4. Andere Methoden (die zytologische, biologische) geben keine klare Antwort auf die Frage nach der Richtung der Evolution, teils weil die Daten viel zu mangelhaft sind, teils weil sie entgegengesetzte Theorien gleichmässig unterstützen.

5. Der negative, aber sehr wichtige Hinweis auf die Unwahrscheinlichkeit einer Entstehung der *Secotiaceae* durch Degradation von den Agaricales liegt in der Unmöglichkeit eine überzeugende Aszendenz für die secotiazeennahen Gruppen der *Agaricales* unter anderen Gattungen oder Familien der *Agaricales*, oder unter gewissen Gattungen und Familien der *Aphyllophorales* zu finden; besonders unwahrscheinlich ist die Thesis, dass die *Russulaceae* von den *Hygrophoraceae* abzuleiten seien, und die Thesis, dass die *Boletaceae* polyphyletisch (teilweise von Porlingen) abzuleiten seien. Ebenfalls negativ aber wichtig ist der Nachweis, dass die Degradationshypothese annehmen muss, dass die Basidie nach einer sehr langen Epoche der Typostasis wieder in typische Typogenesis übergegangen sei.

6. Die Gattung *Neosecotium (Secotium macrosporum* Lloyd), die zweifellos den *Agariceae* und den *Lycoperdaceae* nahesteht, zeigt, dass die *Secotiaceae* nicht die einzige Gruppe unter den Gastromyceten ist, die Affinität mit den *Agaricales* hat. Infolgedessen ist es weiterhin erlaubt, von einer Ableitung der *Agaricales* von den Gastromyceten zu sprechen.

7. Die primitivsten und ältesten Gastromyceten sind wohl eher von einer heute nicht mehr klar zu identifizierenden und vielleicht ausgestorbenen Gruppe von Pilzen abzuleiten als von *Ascocorticium* über die *Corticiaceae*. Auf Tafel III gibt der Autor ein stark reduziertes Schema, wie er sich das Gesamtsystem der Pilze vom phylogenetischen Standpunkt im Lichte der Secotiazeen-Studien vorstellt.

8. Viele der Tatsachen, die der gegenwärtigen Arbeit zugrundeliegen, sind durch monographische Studien über verschiedene Triben der *Secotiaceae* ans Licht gekommen. Diese Studien wurden von Singer & A. H. Smith 1957—58 ausgeführt und sind gegenwärtig im Druck. Ein phylogenetischer Ausdruck der generischen Systematik, die in diesen Arbeiten enthalten ist, kann auf Tafel I meiner hier vorliegenden Arbeit (oben) eingesehen werden.

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Synchytrium namae Karl.*

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With 15 textfigures.

Synchytrium namae was created by the author (1956) for a parasite on *Nama hispidum* which Constance and Lundell collected in Starr Co., Texas. Subsequently, in studying herbarium specimens from W. H. Long's collection at Cornell University I found that it occurs on *Nama jamaicense* also. The latter specimens were collected in Texas in 1901, but the collector and locality are not listed on the herbarium sheet. Inasmuch as the material is from Long's collection I am assuming that he collected it at or near Austin, Texas in Travis County.

Only resting spores were found in both of these collections, and for this reason *S. namae* was described as a short-cycled, simply monogallic species and placed in the subgenus *Pycnochytrium.* In April 1958, I found it abundantly on *Nama jamaicense* near Austin, Texas, and a study of living material showed that it is a longcycled, simply dihomeogallic species which forms both sporangial sori and resting spores. Accordingly, my previous description and classification are incomplete, and this contribution is presented to supplement them and to diagnose and classify *S. namae* more accurately. On the basis of this new data, it may be diagnosed as follows:

Prosori usually solitary, rarely 2 in a cell, ovoid, 44—60 × 58—70 μ, subspherical, 45—80 μ, to almost hemispherical or reniform with amber walls, 1.5—2 μ thick; usually lying at one side of sori when empty. Sori subspherical 52—86 μ, or ovoid, 50—60 × 63—78 μ; plugs between empty prosori and sori disc-shaped and oval, 8—11 × 12—16 μ, or almost circular 9—18 μ in outline. Sporangia 4—20 per sorus, polyhedral, 30—50 μ in greatest diameter, small ones 18—26 μ, exceptionally large ones 55—60 μ with golden-red content; usually bursting out of gall and lying in a powdery mass on host around gall at maturity. Zoospores ovoid to oblong and elongate while actively swimming, 2—3 × 4—5 μ, with a golden-red globule and a 11—14 μ long whip-lash flagellum. Resting spores usually solitary, sometimes 2 in a cell, spherical, 36—78 μ or ovoid, 24—50 × 32—72 μ, with a

*) This study as been supported by a grant from the National Science Foundation.

smooth dark amber-brown wall, 4—6 μ thick; enveloping residue abundant and dense or sparse or lacking; germination unknown.

Simply dihomeogallic, galls abundant on stems, petioles and both surfaces of leaves but causing no malformation of host. Spo-

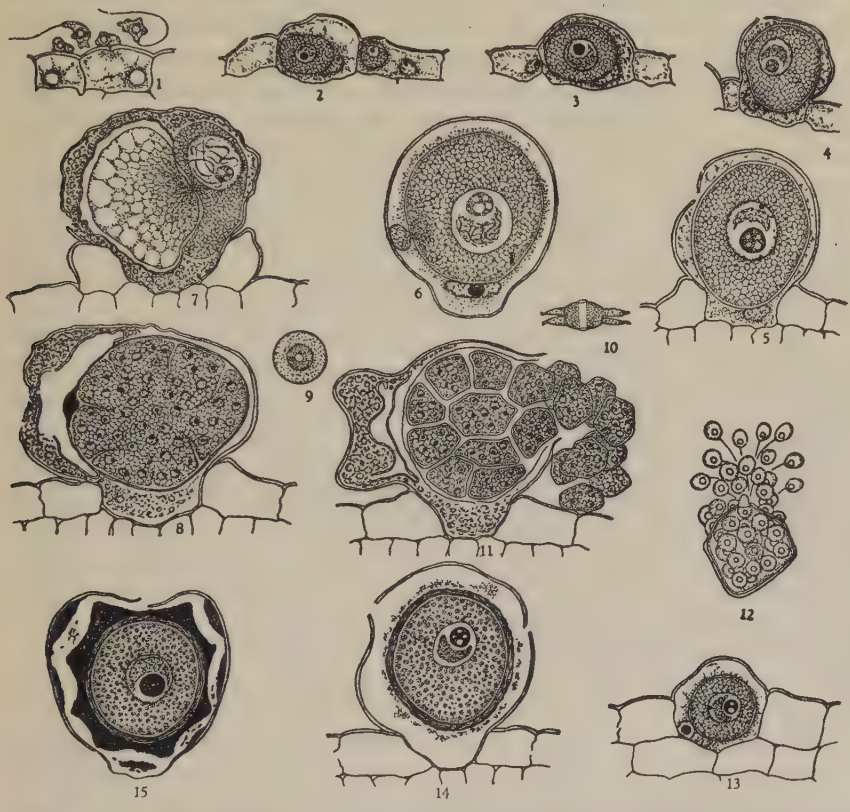

Fig. 1—15. *Synchytrium namae*. Fig. 1. Infection of living epidermal cells. × 280. Fig. 2, 3. Young parasites in enlarging host cells; host nucleus in base of cells. × 240. Fig. 4, 5. Later stages in development of gall and initial cell or prosorus of parasite. × 240. Fig. 6. Mature prosorus; protoplasm beginning to grow out at left. × 240. Fig. 7. Later stage in sorus development from prosorus; primary nucleus has migrated into incipient sorus. × 240. Fig. 8. Cleavage in sorus; collapsed prosorus, plug and residue at left. × 240. Fig. 9, 10. Surface and cross sections of plug. × 500. Fig. 11. Bursting of sorus and gall walls, liberating sporangia on surface of host. × 260. Fig. 12. Discharge of zoospores from sporangium. × 460. Fig. 13. Young stage of resting spore development. × 240. Fig. 14, 15. Mature resting spores with sparse and abundant enveloping residue. × 280.

rangial galls orange-colored, subspherical, 80—150 μ, to broadly obpyriform, 85—100 × 95—120 μ, or broadly clavate with a hyaline wall, 2.8—4 μ thick. Resting-spore galls dark-brown, subspherical 60—130 μ, ovoid, 48—65 × 52—84 μ, broadly obpyriform, 36—38 × 60—

80 μ, or oblong, 52—60 × 80—110 μ, with a hyaline wall, becoming cups-shaped, or potyhedral, or wrinkled after drying oul.

On *Nama hispidum* and *N. jamaicense,* Starr and Travis Counties, Texas, U.S.A.

The basic developmental phases of *S. namae* are shown in figs. 1—15. The processes of infection of the epidermal cell (fig. 1), its enlargement outward to become a simple gall (fig. 2, 3) as the initial cell of the parasite develops into a prosorus (fig. 3—5), the migration of the protoplasm from the prosorus outward into a vesicle (fig. 6, 7), and the development of the latter into a sorus of sporangia (fig. 8, 9) are essentially the same as those of similar long-cycled, simply dihomeogallic species whose initial cells function as prosori. Accordingly, these processes need not be described again in detail, and the present description will be limited to host reaction and other distinguishing details of the parasite.

It is to be noted particularly that infection of the epidermal cell does not stimulate mitosis and cell division but merely cell enlargement (fig. 2—6). Occasionally, adjacent epidermal cells may enlarge slightly outward (fig. 7), but not to the extent that they form a rudimentary basal sheath as in *S. potentillae.* The host nucleus enlarges considerably (fig. 3, 6) as the epidermal cell increases in size and usually lies in the base underneath the parasite (fig. 2, 3, 6). It usually persists until the prosorus is mature (fig. 6) and gradually disintegrates as the sorus and sporangia are formed. In some galls the host cytoplasm increases markedly in amount around the parasite, as is indicated later by the residue present around the prosorus (fig. 7), while in others the residue may be very scarce or almost lacking (fig. 6).

Occasionally, the sorus develops beneath the prosorus, but in most galls it is formed at one side (fig. 6, 7, 8). The protoplasm migrates or grows out slowly through a pore in the wall (fig. 6, 7) to form a vesicle which develops a walls of its own and eventually becomes the sorus. The prosorus and sorus, however, remain attached at the pore, and this attachment is accomplished by the formation of a dense staining plug in this region (fig. 8) as I (1955 a, b) have described in several species whose initial cell functions as a prosorus. In *S. namae* this plug is quite conspicuous, and in median sections has the appearance of an oval or circular discus whose thickness decreases towards the periphery. In surface views of carefully fixed and stained preparations of the plug three concentric zones are visible — an outer lightly-stained zone, a median denser zone, and a small almost hyaline central zone (fig. 9). Cross sections (fig. 10) of the plug indicate that these zones correspond to differences in degree of thickening of the prosorus and sorus walls.

As the sorus develops and its content cleaves into sporangia (fig. 8) it apparently expands, and this leads to a slight lateral elongation of the gall. As shown in fig. 8 of a median section of this stage the sorus lies slightly to one side with the collapsed prosorus and residue at the opposite side. Further expansion of the sorus and sporangia causes the walls of the sorus and gall to burst, and the sporangia are thereby released onto the surface of the host (fig. 11). As they dry out they appear as powdery golden red masses around the galls, and this is a characteristic appearance of *S. namae.* At this stage the portion of the gall containing the collapsed prosorus and residue appears as an invaginated cap at one side (fig. 11).

So far no gametic fusions have been seen in relation to resting spore formation. Its development and the reaction of the host cell to its presence are basically the same as described for the incipient prosorus. The resting spore may be distinguished fairly early (fig. 13) by its denser and more granular cytoplasm and a gradual thickening of its wall, and as it attains maturity the cytoplasm has the appearance of minute granular islands suspended in a hyaline background (fig. 14, 15). The amount of residue which envelops the mature spore varies markedly as in the case of the prosori. In some galls it is lacking almost entirely (fig. 14), while in others it may be very abundant and forms a dense broad layer closely adherent to the spore wall (fig. 15). In this respect the reaction of *Nama jamaicense* appears to be different from that of *N. hispidum* where I (1956) found the residue to be very abundant in most resting-spore galls. Attempts to induce resting spore germination by long refrigeration and alternate drying and wetting of the spores have failed, and it is not known whether they function as prosori or sporangia in germination *).

So far only five simply dihomeogallic species are known, and this study of *S. namae* adds a sixth one to the list. Of these only *S. maculans* is fully known and belongs in the subgenus *Microsynchytrium. Synchytrium amsinckiae* has been placed in this subgenus also, while the other three, *S. papillatum, S. trichophilum,* and *S. eremocarpae,* have been assigned to *Pycnochytrium.* However, resting spore germination has not been observed in any of these five species, and their classification is, accordingly, tentative. *Synchytrium namae* is placed temporarily in *Microsynchytrium,* pending discovery of the manner in which the resting spores germinate.

Insofar as its known life cycle is concerned it resembles *S. maculans* and *S. amsinckiae* which parasitize *Sida rhombifolia* and *Am-*

*) „Since this paper went to press the resting spores have been found to function as prosori in germination. Accordingly, *S. namae* belongs in the subgenus Microsynchytrium."

sinickiae intermedia, respectively, but its sori, sporangia and resting spores as well as the galls which it induces are generally smaller than those of these species. Also, its sorus is usually formed at one side of the prosorus instead of underneath as in *S. amsinckiae.*

McMurphy's (1913) and Lingappa's (1955) studies suggest that *S. amsinckiae* and *S. maculans* have very limited host ranges and will not infect any but their respective hosts. If this proves to be true it is not likely that either of them will be found on *Nama* species. So far, no host range studies have been made with *S. namae,* but in this connection it may be noted that it did not occur on any of the numerous species such as *Stachys agraria, Prunella vulgaris, Stellaria media, Cerastium viscosum, Geranium carolineanum, Dichondra repens, Abutilon theofrasti, Oenothera biennis, Trifolium repens* and other weeds growing among the infected *Nama jamaicense* plants.

Synchytrium stachydis was found in great abundance on *Stachys agraria* in the same locality as *S. namae,* but it did not occur on *N. jamaicens* or any of the other plants listed above. This species was reported from Louisiana by Cook (1945 a, b), and the discovery of its presence in Texas extends its range considerably. Doubtless, it will be found elsewhere in the southern and southwestern states where *Stachys agraria* occurs. In the space of an acre in Texas hundreds of plants were found to be infected with the characteristic symptoms of yellow swollen stems and branches. Such plants were transplanted to the greenhouses at Purdue and have been maintained for more than eight months. Zoospores from such infected plants were placed on the emerging leaves of *Stachys hispida* where they caused symptoms similar to those on *S. agraria.*

Summary.

Synchytrium namae, which was previously described by the author as a short-cycled species of the subgenus *Pycnochytrium,* has been found to be long-cycled on *Nama jamaicense* in Texas. It produces prosori, sori, sporangia, zoospores and resting spores in succession, and for this reason it is transferred tentatively to the subgenus *Microsynchytrium,* pending discovery of the method by which its resting spores germinate.

Synchytrium stachydis Cook was found in great abundance on *Stachys agraria* in the same locality as *S. namae* and transferred to *Stachys hispida* on which it caused symptoms similar to those on *S. agraria.*

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Drei neue Fungi imperfecti der australischen Flora.

Von F. Petrak (Wien).

Phyllosticta aecidiorum Petr. n. spec.

Maculae amphigenae, irregulariter et laxe dispersae, solitariae, ambitu orbiculares vel ellipticae, sed semper plus minusve angulosae et irregulares, alutaceae vel obscure griseo-brunneae, linea tenuissima nigrescente plerumque bene limitatae, decoloratione sordide brunneo-violacea vel purpurascente indistincte marginata circumdatae, 3—8 mm diam., non raro binae compluresve aggregatae, tunc plus minusve, saepe omnino confluentes et magnam folii partem occupantes; pycnidia epiphylla, raro etiam hypophylla, subepidermalia, globosa vel late ellipsoidea, plus minusve depressa, quoad magnitudinem variabilissima, 70—230 μ, plerumque ca. 100—200 μ diam., ostiolo papilliformi poro irregulariter rotundato, 10—15 μ diam. vel elliptico, tunc usque ad 25 ⇌ 10 μ magno pertuso punctiformiter erumpentia; pariete membranaceo, ca. 7—10 μ crasso pseudoparenchymatico, e cellulis rotundato-angulosis, vix vel parum compressis, nunc pallide flavo-brunnescentibus, in ostiolo tantum obscurius coloratis, nunc undique obscure olivaceis 5—10 μ diam. metientibus composito; conidia numerosissima oblonga, anguste ellipsoidea, utrinque obtusa, vix vel parum attenuata, tunc subfusiformia vel subclavata, recta, raro inaequilatera vel curvula, hyalina, continua, saepe guttulis oleosis minutissimis nonnullis praedita, 5—10 ⇌ 3—5 μ, in cellulis superficiei parietis interioris oriunda.

In den durch das Äzidium von *Puccinia Saccardoi* Ludw. befallenen Stellen lebender Blätter von *Goodenia ovata*; Australien; NSW.: Clyde Mts., 30. VI. 1958, leg. E. Gauba.

Die Äzidien der *Puccinia Saccardoi* bilden rundliche, lockere oder ziemlich dichte Herden und verursachen nur hell gelbgrünliche, sehr unscharf begrenzte Verfärbungen. Der hier beschriebene Pilz ist offenbar ein Schwächeparasit, der die durch das Äzidium erkrankten Stellen befällt, rasch zum Absterben bringt und dann die oben beschriebenen mehr oder weniger scharf begrenzten, lederbraunen, zuweilen mehr oder weniger grosse Teile des Blattes zum Absterben bringenden Flecken verursacht. Auffällig ist die grosse Variabilität der Pyknidengrösse dieses Pilzes, die innerhalb der oben angegebenen Grössen schwanken kann.

Microdiplodia acaciarum Petr. n. spec.

Maculae utrinque visibiles, plerumque in apice phyllodiorum oriundae, basin versus paulatim accrescentes et mox phyllodia omnino occupantes, obscure griseo-brunneae vel olivaceae, postea plus minusve expallescentes, tunc pallide brunneae vel flavo-brunnescentes; pycnidia amphigena, irregulariter laxe vel subdense dispersa, solitaria vel bina complurave plus minusve aggregata, tunc saepe plus minusve connata, raro etiam confluentia, subepidermalia, globosa vel late ellipsoidea, saepe plus minusve depressa, ca. 100—150 μ raro usque ad 200 μ diam., rarissime etiam paulo majora, ostiolo plano, late papilliformi vel truncato-conico, poro rotundato-anguloso, indistincte limitato, ca. 10—15 μ diam. perforato punctiformiter erumpentia; pariete membranaceo, ca. 15—20 μ crasso, contextu pseudoparenchymatico, e cellulis rotundato-angulosis, 6—10 μ, raro usque ad 12 μ diam. metientibus, pallide olivaceis vel obscure melleis, apicem versus paulatim minoribus et obscurius coloratis, in ostiolo multo minoribus composito, extus hyphis mycelii plurimis, varie curvatis et intertextis, subhyalinis, pallide flavidis vel olivascentibus 3—9 μ crassis praedito; conidia numerosissima, ellipsoidea, oblongo-ovoidea, piriformia vel crasse clavata, utrinque late rotundata, antice vix vel parum, postice interdum distincte attenuata, recta raro inaequilatera, minora interdum continua, majora circa medium septata, rarissime etiam septis 2 transversis praedita, non vel lenissime contracta, amoene olivacea, episporo ca. 0.5 μ crasso, 9—14 u raro ad 16.5 μ longa, 4—6 μ lata in conidiophoris brevissime bacillari-filiformibus, ca. 2—3 μ longis, mox viescentibus et mucosis oriunda.

Auf lebenden Phyllodien von *Acacia* cfr. *longifolia* oder *A.* cfr. *intertexta*; Australien; Pigeon House Range, 26. II. 1957, leg. E. Gauba.

Die aus Italien bekannt gewordene *Microdiplodia phyllodiorum* (Penz. et Sacc.) Tassi soll wesentlich kleinere, nur 6—10 ⇌ 4—5 μ grosse Konidien haben und muss schon aus diesem Grunde als hinreichend verschieden erachtet werden. In Gesellschaft dieses Pilzes kommt zuweilen auch eine Form von *Pestalozzia casuarinae* Cke. et Mass. vor, die durch etwas grössere Konidien vom Typus abweicht.

Pestalozzia macrozamiae Petr. n. spec.

Acervuli in seminum testa irregulariter et plus minusve dense dispersi, raro solitarii, ambitu orbiculares vel elliptici, epidermide pustulatim elevata diu tecti, omnino clausi, in maturitate plerumque ad marginem disrumpentes, 0.2—1.5 mm diam., saepe bini compluresve dense aggregati, tunc plerumque omnino confluentes, quoad formam et magnitudinem variabilissimi, 1.5—15 mm longi, 1—3.5 mm lati, raro recti, plerumque plus minusve curvati et ramulosi; strato

basali ca. 250—400 μ crasso, parenchymati matricis innato, eiusque reliquiis penetrato; strato tegente epidermidi arte adnato et plus minusve innato, ca. 15—35 μ, ad basis marginem usque ad 100 μ crasso, contextu pseudoparenchymatico e cellulis aut rotundato-angulosis, pro ratione crassiuscule tunicatis, ca. 3—7 μ diam. metientibus aut plus minusve elongatis, usque ad 14 μ longis, 2.5—3.5 μ tantum latis, superne hyalinis, inferne pallidissime flavidis composito; conidia crassiuscule fusiformia, interdum subclavata, utrinque plus minusve, antice interdum vix vel parum attenuata, recta, raro inaequilatera vel parum curvula, 4-septata, vix vel leniter constricta, 24—32 μ, raro usque ad 36 μ longa, 6.5—9.5 μ lata, cellulis tribus mediis 18—24 μ longis obscure olivaceis, cellula basali conoidea, obtusiuscula, 3.5—5 μ, raro usque ad 9 μ longa, fragmento conidiophori 3.5—6 μ, raro ad 10 μ longo, ca. 1 μ crasso aucta, cellula apicali obtuse vel plus minusve truncato-conoidea, 3—3.5 μ longa, ciliis 3, rarissime 2 vel 4 filiformibus subrectis vel saepe plus minusve horizontaliter patentibus, non raro etiam plus minusve reflexis, ca. 20—35 μ, raro usque ad 46 μ longis, 1—1.5 μ crassis praedita; conidiophora strati basalis superficiem tantum obtegentia, densissime stipata, quoad longitudinem variabilissima, ca. 15—30 μ, saepe usque ad 100 μ longa, inferne 2.5—3.5 μ, superne ca. 1.5 μ crassa, sero viescentia et mucosa.

Auf der Sarkotesta von *Macrozamia spiralis*; Australien; NSW.: Nelligen, 30. V. 1958, leg. E. Gauba.

In bezug auf Form und Grösse sind die Fruchtkörper des oben beschriebenen Pilzes ausserordentlich veränderlich. Bald sind sie ziemlich klein, dann meist rundlich oder breit elliptisch im Umriss, oft auch etwas stumpfeckig oder buchtig, und dann mehr oder weniger unregelmässig. Bald locker, bald mehr oder weniger dicht zerstreut, bilden sie zuweilen konzentrische, zur Längsrichtung des Samens mehr oder weniger senkrecht verlaufende Reihen. Wenn sie sehr dicht beisammen oder hintereinander stehen, fliessen sie zusammen und bilden dann bald ziemlich gerade, bald mehr oder weniger gekrümmte, oft auch etwas verästelte, bis 3 mm breite, sich gegen die Enden verjüngende Streifen. Die überaus dicke Basalschicht ist dem Parenchym der Samentesta eingewachsen, unten mit verschrumpften Substratresten durchsetzt, von kleinen, unregelmässigen Hohlräumen unterbrochen und besteht aus ziemlich kleinzelligem, subhyalinem, in dickeren Schichten hell gelbbräunlichem Gewebe. Die oberste, ca 40 μ dicke Schicht ist völlig hyalin, ihre Zellen sind sehr inhaltsreich, strecken sich oben und bilden kurze, senkrecht parallele Reihen, die oben in die Konidienträger übergehen. Diese sind verschieden, zum Teil bis ca. 100 μ lang, ziemlich derb fädig und verschleimen erst spät. Ein kurzes, ca. 3.5—6 μ, selten bis 10 μ langes Stück des Trägers bleibt meist am unteren Ende der frei werdenden Konidien hängen.

Auf Cycadeen wurden bisher zwei *Pestalozzia*-Arten beschrieben, nämlich *P. encephalartos* Laughton in Bothalia IV., p. 823 (1948) auf *Encephalartos villosus* und *Stangeria eriopus* und *Pestalotiopsis Guepini* (Desm.) Steyaert var. *major* Steyaert in Trans. Brit. Mycol. Soc. XXXVI. p. 237 (1953) auf *Encephalartos Barteri*. Laughton's Pilz unterscheidet sich nach der Beschreibung von *P. macrozamiae* durch wesentlich kleinere, nur 18—25 ⇌ 6—9 µ grosse Konidien, bei denen von den drei olivbraunen Mittelzellen nur die mittlere oder die beiden oberen Zellen wesentlich dunkler gefärbt sind. Für diese Art werden auch kürzere, nur 17—25 µ lange Zilien angegeben. Steyaert's Pilz dürfte von *P. Guepini* spezifisch verschieden und vielleicht mit *P. encephalartos* identisch sein. *P. macrozamiae* wäre von beiden bisher auf Cycadeenblättern beschriebenen Arten auch durch die oft sehr grossen Fruchtkörper verschieden. Dieses Merkmal hat aber gewiss keine grössere Bedeutung, weil dieser Pilz wohl auch auf Blättern vorkommt und dann wesentlich kleinere Fruchtkörper haben wird.

Studies toward a monograph of the South American species of Marasmius

By Rolf Singer (Tucumán, Argentina.)
With 51 textfigures.

The delimitation and subdivision of the genus *Marasmius* has been discussed in a previous paper by the present author (New Genera of Fungi VIII, Mycologia, **50**: 103—110. 1958). The group which, according to the conclusions of that paper has to be considered the correctly typified and circumscribed interpretation of the generic name *Marasmius* is nearly identical with the conception of the genus as given in the respective chapter in Lilloa 22, The Agaricales (Mushrooms) in modern Taxonomy (Singer 1951). This genus is a very important element of the tropical and subtropical basidiomycetous flora, and as such, together with *Marasmiellus* and *Lepiota* (with allied genera such as *Leucoagaricus*) one of the leading basidiomycetous genera in South America (not taking into account the ubiquitous polypore genera *Coriolus, Coriolopsis, Pycnoporus, Fomitopsis, Phellinus,* and some "thelephoraceous" genera). As far as the number of different species is concerned, the three agaric genera named are probably among the most important fungous genera of the continent.

Among the *Agaricales* of the tropics, *Marasmii* have always been a favored object for collection. Since they are fruiting during a relatively longer period of time than most other agarics although not as long as some aphyllophoraceous fructifications, they are hard to overlook; they are also strikingly beautiful in many cases, and what is more important for the collector, they are relatively easy to collect (since they are not very fragile), to prepare and to ship, they are extremely prominent in collections sent to the various herbaria by collectors in the tropics. This has desirable and undesirable consequences. In the first place, a relatively large (although still insufficient) percentage of the general *Marasmius* flora has been gathered, inserted, and described where other genera have remained unexplored. On the other hand, the specimens were often not in proper shape for study inasmuch as the collectors, mostly phanerogamists, or at any rate botanists not familiar with fungi, gathered many sterile specimens, and the authors of the new species resulting from these collections, with the single exception of Patouillard, contented themselves with rough macroscopical diagnoses, only too often made

without the help of collector's notes on colors and habitat, and without a personal knowledge of the tropical agarics in the field. Only since 1948 (if we discard the early attempts by T h e i s s e n in South Brazil) have specialists visited tropical America and systematically collected Marasmii. It is for this reason only that I limit myself to the species of the American tropics. The rich *Marasmius* flora of tropical Africa, Asia and Australia has been neglected in the preparation of this paper, at least to a certain degree, and it is not impossible that species named here from American material may turn out to be identical with earlier binomials published from other parts of the world. Wherever such a possibility has been foreseen, the respective type studies were made. But a world monograph of *Marasmius* is such an enormous task that I feel it has to be accomplished by steps. The present paper is no more than a step toward a monograph, and as such should not be consulted in order to compile lists for floral analysis, nor can it be guaranteed that every name used here is necessarily based on the oldest existing epithet. Colors are indicated in terms of R i d g w a y (R.) and M a e r z & P a u l 1st ed. (M & P). Names of herbaria are indicated according to the internationally approved abbreviations published by L a n j o u w.

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Survey of the sections and species of tropical and subtropical South America.

Genus **Marasmius,**

Section **Androsacei** Kühner
M. p r o l e t a r i u s Berk. & Curt.

Section **Fusicystides** Sing.
M. isabellinus Pat. (*M. fusicystis* Sing. in Sing. & Digilio)

Section **Epiphylli** Kühner
M. e u o s m u s Sing.
M. m a r t i n i Sing. (*Cymatella longipes* Martin)
M. c a r p e n t e r i a n u s Sing.

Section **Alliacei** Kühner
M. podocarpi Sing. in Sing. & Digilio.
M. oligocystis Sing.
M. ionides Pat.
M. smaragdinus (Berk.) Sing. (*Agaricus*, Berk., *Marasmius viridifuscus* Berk. Curt., *Omphalina*, Dennis).

Section **Hygrometrici** Kühner
Subsection *Dispares* Sing.
M. dispar (Mont.) Fr. (*Agaricus*, Mont.)
Subsection *Genuini* Sing.
M. ilicis Sing.
M. crescentiae Murr.
M. magnoliae Sing.

Section **Neosessiles** Sing.
M. neosessilis Sing.

Section **Apus** Sacc.
M. sessiliaffinis Sing.
M. spaniophyllus Berk. (*M. iguazuensis* Sing. in Sing. & Digilio).

Section **Globulares** Kühner
M. murrillianus Sing. (*Gymnopus setulosus* Murr.; *Marasmius*, Sing. non Murr.)
M. plumieri (Lév.) Sing. (*Heliomyces*, Lév.)
M. pampicola (Speg.) Sing. (*Collybia*, Speg.)
M. viegasii Sing.
M. rhyssophyllus Mont. (*Dictyoploca*, Baker & Dale)
[*M. oreades* (Bolt. ex Fr.) Fr.]
M. heliomyces Murr.
Stirps *Niveus: M. niveus* Mont. (*Collybia*, Dennis). — *M. cohortalis* Berk. (*Collybia nivea* var. *cohortalis* (Berk.) Dennis; *Collybia hymeniicephala* Speg.; *Marasmius*, Sing., *Marasmius alachuanus* Murr.), and var. *hymeniicephalus* (Speg.) Sing., var. *arenicolor* Sing., var. *pseudocollinus* Sing. & Digilio. — *M. albogriseus* (Peck) Sing. (*Collybia*, Peck, *Collybia fimicola* Earle).
M. riparius Sing. in Sing. & Digilio.
M. silvicola Sing. in Sing. & Digilio.
M. lilacinus (Coker) Sing. (*Collybia*, Coker).

Section **Sicci** Sing.
Subsection *Inaequales* Sing.
M. inaequalis Berk. & Curt.
Subsection *Siccini* Sing.
Stirps *Cohaerens: M. flammans* Berk., *M. cohaerens* (A. & S. ex Fr.) Quél. [*Mycena*, Gill., *Agaricus*, A. & S., *Marasmius ceratopus* (Pers.) Quél.; *Agaricus spinuliferus* Peck.; *Collybia*, Sacc.; *M. setulosus* Murr.); *M. jalapensis* Murr.; *echinatulus* Sing.
M. coprophilus Speg.
M. tucumanus Sing. in Sing. & Digilio.
M. tageticolor Berk.
M. bellus Berk.
M. subrotula Murr. ss. Dennis (an Murr.).

M. digilioi Sing. in Sing. & Digilio.
M. trinitatis Dennis.
M. longisporus (Pat.) Sacc. (*Androsaceus,* Pat.).
M. rhabarberinus Berk.
M. berteroi (Lév.) Murr. (*Heliomyces,* Lév.).
Stirps *Leoninus: M. corrugatus* (Pat.) Sacc. (*Androsaceus,* Pat.); *M. cladophyllus* Berk. (*Favolaschia magnifica* Henn.; *Laschia,* Sacc., *Marasmius,* Sing.; *M. polyporoides* Murr.); *M. leoninus* Berk. and *M. leoninus* var. *olivascenticeps* Sing.
M. aurantiacus (Murr.) Sing. (*Collybia,* Murr.)
M. orinocensis Pat. (? *M. floridanus* Murr.) and *M. aff. orinocensis.*
Stirps *Atrorubens: M. portoricensis* Murr., cf. *M. rubroflavus* (Theissen) Sing. (*M. nummularius* var. *rubroflavus* Theissen) — *M. atrorubens* (Berk.) Berk. (*Agaricus,* Berk.; *M. castaneus* Mont.) — *M. actinopus* Mont. — *M. bahamensis* Murr.
M. bahamensis Murr.
M. setulosifolius Sing.
M. spegazzinii Sacc. & Syd. (*M. balansae* Speg. non Pat.)
M. haedinus Berk.
Stirps *Ferrugineus: M. montagnei* Sing. — *M. dennisii* Sing. — *M. gardneri* Sing. (*Agaricus ferrugineus* Berk. non Pers. ex Secr.; *Marasmius,* Berk.)
M. anomalus Lasch in Rab. (*M. litoralis* Quél., *M. epodius* Bres.; *M. graminicola* Speg.), cf. *M. coprophilus* Speg. ss. Sing. & Digilio.
M. hinnuleus Berk. & Curt.
Stirps *Haematocephalus: M. haematocephalus* (Mont.) Fr. (*Agaricus,* Mont.; *Androsaceus,* Pat.; *M. rhodocephalus* Fr.; *M. sanguineus* Cooke & Mass.; *M. atropurpureus* Murr.) with var. *oenechinus* Sing., var. *pseudotageticolor* Sing., var. *transiens* Sing. (*M. semipellucidus* Berk. & Br.; ? *M. pallescens* Murr.); — *M. helvolus* Berk. (cf. *M. ferrugineus* (Berk.) Berk. sensu Dennis = *M. paucifolius* Murr.)
M. glaucopus (Pat.) Sacc., cf. *M. rubroflavus* (Theissen) Sing. (*M. nummularius* var. *rubroflavus* Theissen)
M. tener Berk. & Curt. (cf. *M. pusio* Berk. & Curt.)

Section **Rotulae** Fr.
M. rotuloides Dennis.
M. multiceps Berk. & Curt.
M. cupressiformis Berk.
M. defibulatus Sing.
Stirps *Populiformis: M. submultiformis* Murr. — *M. trichorhizus* Speg. and var. *aripoensis* Dennis — *M. populiformis* Berk.
M. platyspermus Sing. in Sing. & Digilio.
M. rotalis Berk. & Br. and its (unnamed) variety *M. rotalis* sensu Sing. & Digilio.
M. puttemansii Henn.
M. aciculiformis Berk. & Curt.
M. pallipes Speg.
M. bromeliacearum Sing. in Sing. & Digilio.
M. guyanensis Mont.; cf. *M. guyanensis* Mont. sensu Dennis; cf. *M. equicrinis* Muell. in Berk. sensu Petch; cf. *M. hiorami* Murr.
M. arimana Dennis.
M. rufomarginatus Sing.
M. rubromarginatus Dennis.
M. ruforotula Sing.

M. marthae Sing.
M. sanguirotalis Sing. in Sing. & Digilio.
M. polycladus Mont. and *M. hippiochaetes* Berk. (= *M. edwallianus* Henn.)
M. praecox Sing.
M. griseoviolaceus Petch.
Stirps *Graminum: M. graminum* (Libert) Fr. (*Agaricus*, Lib.; *M. pruinatus* Berk. & Curt.; *M. culmisedus* Sing. in Sing. & Digilio), with the var. *culmisedus* (Sing. in Sing. & Digilio) Sing.; var. *dicotyledoneus* Sing. ad int.; var. *cynodontis* Sing. ad int.; var. *foliicola* Sing. ad int.; var. *brevisporus* Dennis

Keys to the species of tropical and subtropical American Marasmii.

1. Section **Androsacei**
   Key not needed.
2. Section **Fusicystides**
   Key not needed
3. Section **Epiphylli**

A. Clamp connections present.
  B. Hymenophore present, anastomosing-poroid; odor pleasant; spores less than 4.5 μ long; Panamá *M. euosmus*
  B. Hymenophore absent, or typically lamellate, neither venose nor poroid; odor none.
    C. Hymenophore lamellate; dermatocystidia scattered but conspicuous on the surface of the pileus; cystidia conspicuous (see *Pseudohiatula albocapitatus* (Petch) Sing.)
    C. Hymenophore none (hymenium smooth); dermatocystidia none; cystidia on hymenial surface present but not very conspicuous. Colombia. *M. martini*
A. Clamp connections absent *M. carpenterianus*

4. Section *Alliacei.*

A. Carpophores green when fresh *M. smaragdinus*
A. Carpophores not green when fresh.
  B. Epicuticular cells filled with violet pigment when freshly dried *M. ionides*
  B. Epicuticular cells either hyaline or filled with cinnamon pigment.
    C. Pileus hyaline or sordid gray to gray, often white when dry, not cinnamon, or ochraceous brown to buffy isabelline; lamellae often reticulately anastomosing to almost poroid; epicutis hymeniform, composed of unicellular elements.
      D. Lamellae adnexed, on humus and foliage, not on conifers (see *Globulares*)
      D. Lamellae decurrent; on *Podocarpus* needles. *M. podocarpi*
    C. Pileus cinnamon, ochraceous brown, or buffy-isabelline; lamellae not strongly intervenose; epicutis consisting of a trichodermial palisade formed by up to 4-celled elements, or else fragmentary, of isolated and more or less scattered swollen elements.
      E. Epicutis — a trichodermial palisade, cinnamon; spores 3.7—4.8 μ broad (see *Pseudohiatula cinnamomea* (Dennis) Sing.
      E. Epicutis fragmentary, its elements often interrupted by exposed hypodermium; spores narrower.

F. Lamellae adnato-decurrent. Florida
(see *Gymnopus subagricola*)
F. Lamellae subfree. Brazil *M. oligocystis*

5. Section *Hygrometrici.*

A. Spores larger than 10 μ long; pileus not pilose; epicuticular broom cells with erect apical setulae, almost crested. *M. dispar*
A. Spores smaller than 10 μ long, or unknown; pileus pilose, *or* all broom cells with divergent setulae all over (except on pedicel).
B. Pileus not pilose.
C. Pileus ochraceous; epicutis subhyaline; on *Crescentia cujete*, Cuba. *M. crescentiae*
C. Pileus and epicutis much deeper colored; on *Ilex macrodontus*, Brazil. *M. ilicis*
B. Pileus pilose; on *Magnolia grandiflora* in Florida. *M. magnoliae*

6. *Apus* (key not necessary).

7. *Neosessiles* (key not needed).

8. *Globulares.*

A. Pileus beset with seta-like bodies *M. murrillianus*
A. Pileus not setose.
B. Spores 11—16 μ long, or at least many spores longer than 11 μ.
C. Pileus white *M. plumieri*
C. Pileus distinctly pigmented.
D. Spores 10—15 × 4.5—5.5 μ. On mountain meadows and in pampa vegetation in Southern South America. *M. pampicola*
D. Spores 16 × 4 μ. Growing from white rhizomorphs, not in open places, or on wood. Brazil. *M. viegasii*
B. Spores up to 10.2 μ long.
E. Pileus wax yellow or even bringther yellow; lamellae also yellowish, intervenose. West Indies and Northern North America. *M. rhyssophyllus*
E. Pileus either not yellowish at all, or not with yellowish and intervenose lamellae.
F. Cystidia on the sides of the lamellae absent, on the edge rare and inconspicuous, or absent.
G. Growing in open places directly on earth, rarely on dung, sometimes in parks or plantations but never on litter, foliage, or wood; pileus not white when fresh, or not remaining so when mature (moist); lamellae moderately distant but very broad, often somewhat anastomosing but not regularly intervenose or poroid; margin of pileus subsmooth at maturity.
H. Introduced species with stuffed stipe and spores (7)—8—10 × 4—5.8 μ; odor of HCN *M. oreades*
H. Native species with the stipe soon becoming hollow; spores rarely larger than 8.8 μ; odor of HCN very weak, or none.
I. Stipe tending to yellowish brown
M. cohortalis var. *pseudocollinus*
I. Stipe tending to grayish. In South America in the upper montane and alpine zone *M. albogriseus*

G. Growing on forest and plantation litter, dead foliage, buried and rotting wood etc. in dense subtropical and tropical forest, marginal forest, etc. Not combining the characters indicated above.

J. Lamellae not intervenose.

K. Pileus in the center neither grayish nor buff, but white with whitish margin. Brazil, Perú. *M. niveus*

K. Pileus not so colored, often with star-shaped colored zone on disc. Florida. *M. heliomyces*

J. Lamellae strongly intervenose, rarely a few specimens of a group weakly intervenose (mostly the immature ones).

L. Pileus white when dry, hyaline when moist, without yellowish or grayish tinge. *M. cohortalis* var. *hymeniicephalus*

L. Pileus with grayish or yellowish buff tinge at least on disc. when moist.

M. Pileus pale orange buff to light buff in center *M. cohortalis* var. *cohortalis*

M. Pileus tending to sordid gray; lamellae also often sordid cream grayish *M. cohortalis* var. *arenicolor*

F. Cystidia on the sides of the lamellae present and distinct.

N. Spores 8.2—10.2 μ long; pileus colored like *M. oreades*; Argentina *M. riparius*

N. Spores up to 8.3 μ long; pileus differently colored.

O_1 Color of pileus as in *M. pampicola* (deep cinnamon) when fresh (but growing in forests); cystidia hyaline, not turning greenish grey in the Melzer. Southern South America. *M. silvicola*

O_2 Color of pileus usually duller or with a slight lilac tinge; cystidia often with a grayish sap and turning greenish gray in iodine. Southern North America. *M. lilacinus*

O_3 Exact color unknown; poorly characterized species. Cuba. *M. tortipes*

9. Section *Sicci.*

A. Context inamyloid *M. inaequalis*

A. Context amyloid.

B. Setae-like bodies present in some part of the carpophore other than the stipe. (Stirps *Cohaerens*).

C. Lamellae subdistant to distant in mature specimens.

D. Setae partly or entirely brown in mature caps, with thick (mostly less than 3 μ thick) walls, mostly more than 50 μ long. Stipe pubescent. North-Temperate species, reaching, however, Florida in the south. *M. cohaerens*

D. Setae hyaline, with very thick (3 μ or more) walls, mostly less than 50 μ long, Brazil *M. flammans*

C. Lamellae close or subclose.

E. Setae on sides of lamellae none. Southern South America. *M. echinatulus*

E. Setae on sides of lamellae present. Mexico. *M. jalapensis*

B. Setae none (except for occasionally strongly elongated setulae on epicuticular or cheilocystidial broom cells).

F. Pileus scarlet red, purple, pink, vinaceous, purple black, or maroon; stipe glabrous except for the basal mycelium.

G. Spores larger than 10 μ long.
H. Pileus flame scarlet; spores sometimes reaching 12 μ long; cystidia none (see *M. aurantiacus*).
H. Pileus not so colored; spores usually larger.
I. Cystidia on sides of lamellae: none.
J. Spores 10.5—14 μ long; pileus pink to blood red, not striped. Argentina. *M. tucumanus*
J. Spores about 17.5 μ long; pileus striped. Brazil. *M. tageticolor*
I. Gloeocystidia on sides of lamellae present. Common. *M. haematocephalus*
G. Spores smaller than 10 μ (see *M. aurantiacus*)
F. Pileus yellow orange, orange cinnamon, pinkish cinnamon, fulvous, rusty fulvous, orange fulvous, yellow ochraceous, ochraceous tawny, golden ochraceous, chestnut color, clay color, ochraceous buff, olive, or white to cream color; stipe glabrous *or* pilose.
K. Cystidia on sides of lamellae; none.
L. Stipe glabrous and often shining, occasionally very finely pruinulose at the apex (from broom cells).
M. Pileus white or pale cream color; neither on grass nor on dung.
N_1. Pileus about 20 mm. broad; about twelve through-lamellae present, lamellulae present. Brazil. *M. bellus*
N_2. Pileus 5—9 mm. broad; lamellae about ten, all equal. Trinidad. *M. subrotula* sensu Dennis
N_3. Pileus 2—5 mm. broad; lamellae not equal. See „BB"
M. Pileus not white or pale cream.
O. Pileus with an olive tinge, or yellow ocher (brownish), cork or honey color.
P. Basal mycelium white.
Q. Spores larger than 14 μ. On dung in Argentina. *M. coprophilus* sensu Sing. & Digilio
Q. Spores smaller than 14 μ. On wood or leaves.
R. Spores (6)—7.5—9 × 13—5 μ; lamellae free or subfree; pileus 5—12 mm. broad. Argentina. *M. digilioi*
R. Spores relatively more elongated, (9.8—11 × 3—3.3 μ, sometimes reaching 12 μ long or 4 μ broad); lamellae adnexed; pileus up to 20 mm. broad. Trinidad. *M. trinitatis*
P. Basal mycelium brown or fulvous. Florida to Brazil *M. leoninus* var. *olivascenticeps*
O. Pileus with an orange, rusty, or fulvous to cinnamon tinge, or becoming chestnut color or ochraceous tawny.
S. Spores large 11.5—21 μ long.
T. Pileus small (size of that of *M. haematocephalus*); on wood, Venezuela. *M. longisporus*
T. Pileus reaching larger size.
U. On monocotelydonous culms and leaves; spores about 11.5—13.5 × 3.5—1.5 μ; lamellae not very distant (*M. sp.*, see under *M. leoninus*).

U. Not combining host and spore size as above. Lamellae distant to very distant.

V. Spores 14—19 × 2.3—3.8 μ; lamellae not broad and not anastomosing, basal mycelium light orange fulvous and scarce on type. On fallen evergreen leaves, Amazonas, Brazil. *M. rhabarberinus*

V. Spores 12—15.3 × 3—4.7 μ (i. e. relatively shorter and broader); lamellae broad, sometimes anastomosing; basal tomentum white or buffy white. On foliage and rotten wood, widely distributed. *M. berteroi*

S. Spores 6—11 × 2.3—4.5 μ.

W. Basal tomentum white with fulvous apices or entirely brown to fulvous (Stirps *Leoninus*).

X. Pileus with anastomosing veins, and often strongly corrugated at the center; lamellae close to crowded, not anastomosing. Widely distributed. *M. corrugatus*

X. Pileus smooth, except, often, on the margin which is sulcate or not; lamellae not at the sam time close *and* non-anastomosing.

Y. Lamellae more or less strongly anastomosing; stipe often pruinose all over but somewhat glabrescent. West Indies south to Brazil. *M. cladophyllus*

Y. Lamellae not or scarcely intervenose; stipe glabrous except for the basal tomentum which is white with fulvous tips, or brown to fulvous all over. Brazil. *M. leoninus*

W. Basal mycelium entirely white remaining so.

Z. Pileus smooth or little sulcate, pale orange cinnamon to bright orange or scarlet, membranous Florida south to Trinidad. *M. aurantiacus*

Z. Pileus deeper and more fulvous colored, relatively fleshy, sulcate.

AA. Hyphae homogeneous *M.* aff. *orinocensis*

AA. Hyphae heterogeneous *M. orinocensis*

L. Stipe strongly pruinate, pubescent, or almost short-hirsute.

BB. Lamellae almost poroid, or at least somewhat intervenose (see *M. cladophyllus*)

BB. Not so.

CC. Pileus 2—3 mm. broad, often white; caulocystidia branched (see *M. tener* and *M. pusio*)

CC. Pileus and caulocystidia not so. (Stirps *Atrorubens*).

DD. Lamellae subdistant *M. rubroflavus* (cf. *M. portoricensis*)

DD. Lamellae subclose to close.

EE. Pileus „white to red" (Duss) in fresh condition, drying chestnut to fulvous; stipe short-hirsute from subulate, needle sharp acute, yellowish hairs. Guadeloupe to Guyanas. *M. atrorubens*

EE. Pileus isabelline to clay color when dry, amber brown to buckthorn brown when wet; stipe downy-pruinate from cylindrical or subulate obtuse hyaline hairs.

FF. Basal tomentum white; spores 11—14 × 4 μ (sec. Dennis) *M. actinopus*

FF. Basal tomentum light melleous to bright fulvous or brown; spores 15—15.8 × 3.5—4.2 μ Florida to Bahamas. *M. bahamensis*

K. Cystidia on sides of lamellae present.

GG. Cystidia on sides of lamellae all broom cells. Panamá. *M. setulosifolius*

GG. Cystidia on sides of lamellae hyaline and non-setulose.

HH. Stipe glabrous or minutely subpruinate at apex, mostly shining.

II. Lamellae close or subclose; spores 7.5—8.7 × 3—3.3 μ. Paraguay. *M. spegazzinii*
(if pileus only 2—5 mm. broad, see „OO").

II. Not combining these characters.

JJ. Pileus white when mature. *M. haedinus*

JJ. Pileus not white when mature.

KK. Basal strigosity or tomentum white (or with fulvous apices).

LL. Pileus when dried „Kaiser brown" R. or between „Titian" and „gold br." M & P; stipe at maturity rather deep fuscous, fuliginous umber, or black; lamellae often somewhat intervenose.

MM. Pileus 14—50 mm. broad.

NN. Lamellae distant to very distant (7—12 through lamellae); spores 15—20 × 3—4.5 μ. Guyanas. *M. montagnei*

NN. Lamellae moderately distant or subdistant (more than 12); spores 14—17 × 3—3,5 μ. On bamboo. Trinidad. *M. dennisii*

MM. Pileus 3—9 mm. broad. Brazil. *M. gardneri*

LL. Pileus when dried „hazel" R., or „leather br." to „terrapin" M & P; stipe at maturity light stramineous-umber, later umber, rarely becoming almost black; lamellae distant, not intervenose. Widely distributed. *M. helvolus*
(see also *M. haematocephalus* var. *transiens*).

KK. Basal strigosity brown to tawny. Cuba. *M. hinnuleus*

HH. Stipe pruinate, pubescent, short hirsute all over.

OO. Setulae of cuticular broom cells brown; on wood of *Chrysophyllum* in Guadeloupe. *M. glaucopus*

OO. Setulae of epicuticular broom cells melleous to golden yellow, on fallen branches, on wood, on fern stalks, dead leaves.

PP. Cystidia distinct, rather deep rooting; pileus more than 5 mm. broad; stipe more than 0.2 mm. thick, strongly pruinose-pilose, see „DD".

PP. Cystidia like broader basidioles, or smooth cheilocystidia, not strongly metachromatic in cresyl blue mounts, fusoid-clavate to fusoid-mucronate, 16.5—2.3.3 × 7.3—10 μ; pileus less than 5 mm. broad; stipe less than 0.2 mm. broad, seriate-gregarious on fern rhachis or fallen branchlets of trees (Solanaceae), etc. *M. tener* sensu Sing

10. Rotulae *)

A. Pileus white or pale cream, and remaining so when dried.

B. Carpophores rising in large numbers from a long rhizomorphic filament in which they are inserted.

C. Pileus smaller than 1 mm. Brazil *M. cupressiformis*

C. Pileus larger: about 5 mm. broad *M. multiformis*

B. Carpophores rising from the substratum (dead leaves), not branched. (compare bleached form of *M. griseoviolaceus*). *M. rotuloides*

A. Mature pileus at least partly (not only on the small dark dot above the attachment of the stipe) colored, or becoming distinctly pigmented when drying.

D. Spores 3—5 times longer than broad, reaching more than 14 μ in length; pileus or gill edges red or deep purple; epicuticular broom cells of the Siccus type.

E. Spores very elongated and narrow: 9—16 × 1.5—3 μ; edge of lamellae distinctly discolored, red; trama of pileus inamyloid. Trinidad. *M. rubromarginatus*

E. Spores less narrow; gill edge maroon or not discolored; Argentina.

F. Edge of lamellae maroon; trama of pileus weakly but distinctly amyloid; pileus 4—10 mm. broad *M. marthae*

F. Edge of lammeae not distinctly colored; trama of the pileus inamyloid; pileus slightly smaller *M. sanguirotalis*

D. Spores less than 3 times longer than broad, reaching 14 μ in length, or shorter.

G. Epicuticular broom cells entirely deep purple, red, or vinaceous, of the *Siccus*-type. Pileus and gill edges red; stipe often ramose, usually with seriate nodes. *M. polycladus*

G. Epicuticular broom cells not entirely purple or vinaceous.

H. Pileus (and sometimes gill edges) pink, pinkish, cinnamon, deep orange, ferruginous tawny, dull flesh, orange-red, or yellow and then becoming orange rufous on drying, or bright red becoming reddish orange in age; broom cells of the *Siccus*-type.

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*) The following key is partly artificial because the two types of epicuticular elements, the broom cells of the *Siccus*-type and those of the *Rotalis*-type are not clearly distinguished in some older notes on which the key had to be based, as far as some species are concerned. The same is true for the amyloidity of the apex of the stipe which has not been checked on all specimens.

I. Pileus and gill edges orange red to ocher red; stipe simple or ramose; trama amyloid; spores characteristically broad: 7.3—8.7 × 4.7—5.3 μ; on wood *M. praecox*

I. Not combining these characters; pileus generally less red; stipe always simple; trama often almost inamyloid in the hymenophore; spores generally, either larger, or narrower; more often on leaves or grasses than on wood.

J. On monocotyledoneous hosts.

K. On grasses, perhaps bamboo *M. graminum*

K. On bromeliaceous hosts and on palms.

L. Spores 9.5—11.7 × 5.5 μ; lamellae not with colored edge; pileus pinkish cinnamon to ferrugineous-tawny; on leaves of epithytic Bromeliaceae which have fallen to the ground; subtropical forest in Argentina *M. bromeliacearum*

L. Spores somewhat smaller; lamellae sometimes with orange edge; pileus salmon color to orange or deep orange to rufous; on leaves of Bromeliaceae, or on leaf sheats of palms (see „P").

J. On dicotyledoneous hosts.

M. Spores larger than 10.7 μ.

N. On leaves of *Carapa* in Guyana (?) and Trinidad; spores 11—14 × 3 μ *M. guyanensis* ss. Dennis

N. On twigs and shrubs in Argentina; spores 9.5—12.3 × 3.5—4.7 μ *M. graminum* var. *dicotyledoneus*

M. Spores smaller than 10 μ, or up to 10.7 μ long.

O. Hyphae of hymenophoral trama and pileus practically inamyloid; pileus pallescent in age; edge of lamellae white, scarcely somewhat salmon near the margin of the pileus; center of pileus with black dot; on *Schinus*-roots and perhaps other dicots growing on woody matter, montane zone, Argentina *M. graminum* var. *schini*

O. Trama of hymenophore and pileus distinctly though rather weakly amyloid; not combining all the characters indicated above.

P. On fallen and dead leaves.

Q. On fallen leaves of *Nectandra* in Florida; lamellae only slightly collariate; center of pileus „burnt sienna" (R); diameter (0.7—) 2.5—3 mm.; color „Mars. orange", „English red" (R) in the marginal zone and on the edges of the lamellae; spores 7.7—9.3 × (3.5) —3.7—(4) μ *M. rufomarginatus*

Q. Not combining these characters; Argentina (see *M. ruforotula*)

P. On dead and standing trees, woody branches, etc. Widely distributed. *M. ruforotula*

H. Pileus some other color, or epicuticular broom cells not of the *Siccus*-type.

R. Carpophores arising from a common rhizomorphic strand by branching off alternately with a relatively short stipe; mostly growing on dead wood; spores 6—9 × 2.2—3.5 μ. (Stirps *Populiformis*)

S. Umbo prominent; about 16 lamellae; pileus white with dull bay or chestnut center *M. submulticeps*

S. Umbo prominent or not; lamellae usually fewer; pileus uniformly colored.

T. Umbo prominent; Argentina and Paraguay. *M. trichorhizus*

T. Pileus with shallow umbilicus, with low dark umbo; Brazil (Amazonas) *M. populiformis*

R. Carpophores not as described above, sometimes with long, at times branching stipe which gradually runs into rhizomorphs, or merely accompanied by thin rhizomorphs, or more frequently simple and directly attached to the substratum; on wood, leaves, etc.

U. Pileus and lamellae-edges grayish violet, gray, brownish violet, porphyry gray, sometimes almost black or fuscous in the center; epicuticular broom cells and some of the cheilocystidial broom cells remarkably deep colored; with broad setulae with rounded tips; spores (5.8—)8—10.5 × (3.5)4—5.5 µ; often on bamboo, more rarely on other hosts (Monocotyledoneae) *M. griseoviolaceus*

U. Not combining these characters.

V. Pileus and lamellae-edges sepia; spores 11—14 × 3.5 µ (sec. Dennis); Trinidad. *M. arimana*

V. Not combining these characters.

W. Spores larger than 10 µ, at least a large number of mature spores over 10 µ long always present.

X. Pileus sordid white becoming pale rufescent (Spegazzini), or light grayish brown (Singer), or cinnamon buff (Dennis); stipe long, simple, grayish straw color to pale melleous, remarkably pale colored; spores 7—14 × 4.8—6.3 µ (Possibly all the following forms identical).

Y. 1. Pileus sordid white, becoming rufescent; spores 9.5—12.3 × 4.8—5.2 µ; on branchlets and humified stems; Paraguay *M. pallipes*, type

Y. 2. Pileus light grayish brown; spores 10—14 × 5—6.3 µ; on mossy log; Brazil; epicuticular broom cells of the *Siccus*-type *M. pallipes* ss. Sing.

Y. 3. Pileus cinnamon buff; spores 7—12 × 5—6 µ (sec. Dennis); on living roots of *Ficus benjamina;* Trinidad *M. aciculiformis* ss. Dennis

X. Pileus yellow ocher or umber, or bay, drying to ochraceous buff; stipe dark red-brown to black; spores 11—14 × 3 µ (unknown for *M. guyanensis*, type)

Z. Pileus yellow ocher, dried „orange rufous" (R.); broom cells of the *Siccus*-type; stipe not connected with rhizomorphs; trama of pileus weakly but distinctly amyloid, see „N"

Z. Pileus bay, dried ochraceous buff (secc. Murrill and Dennis), or umber (sec. Mon-

tagne); broom cells almost like those of the *Rotalis*-type (setulae rather short, slightly divergent)

AA. Pileus bay, drying to ochraceous buff; stipe connected with rhizomorphs; fallen leaves and twigs, Porto Rico.
M. hiorami

AA. Pileus umber; stipe not connected with rhizomorphs; trama of pileus inamyloid; on fallen leaves, Guyana.
M. guyanensis, type

W. Spores up to 10 μ long.

BB. Growing on wood, directly or with rhizomorphs, in either case stipes very long.

CC. Pileus whitish to „bure" (M & P) when fresh, on drying entirely ocher gray or pale umber; stipe black or nearly so; spores 7—10 × 4.3—5.7 μ; epicuticular broom cells of the *Rotalis*-type; Argentina. *M. platyspermus*

CC. Pileus not so colored; stipe pale umber or pale fulvous-stramineous; spores 7.5—9.55(—10) × 4—4.2 μ; Cuba.
M. aciculiformis, type

BB. On fallen leaves.

DD. Pileus with a white zone around a central dark spot; stipe often branching, or simple, often connected with rhizomorphs; broom cells of the *Rotalis*-type; spores 7.7—8.8 × 4—4.8 μ; Brazil and Argentina. *M. puttemansii*

DD. Pileus without intermediate white zone; diameter usually 1—2 mm. (larger specimens in tropical Asia, cf. *M. rotalis*, type); stipe usually not branching although sometimes accompanied by rhizomorphs; spores relatively narrower (9.6 × 4 μ, or 7—8 (10) × 3—3.5 μ, or 6—8 × 3 μ).

EE. 1. Pileus mahogany with prominent black umbo; lamellae pale buff; Trinidad.
M. trichorhizus var. *aripoensis*

EE. 2. Pileus only with black dot, argillaceous to yellow brown („aztec" to „chipmunk" M&P); lamellae white when fresh; broom cells of the *Rotalis*-type; Misiones, Argentina.
M. rotalis ss. Singer & Digilio

EE. 3. Pileus umber; broom cells almost of the *Rotalis*-type; French Guyana (see „AA").

Descriptive data and comments on the species of Marasmius in tropical America.

Section *Androsacei* Kühner.

Marasmius proletarius Berk. & Curt.

The type from Cuba (FH) is preserved in the same envelope with specimens labeled *M. proletarius* var. Both are the same species.

Spores hyaline, inamyloid, smooth. ellipsoid-oblong, 7.7—9.2 × 3.3—4.8 μ*); basidia 16.5 × 5.8 μ; cystidia none; cheilocystidia often broom-cell-like or diverticulate; epicutis of pileus hyaline, consisting of a layer of broom cells which do not show a hymeniform arrangement, ascendant to erect, clavate or irregular in shape, even hyphous (hyphal outgrowths of the clavate elements), thus forming an intermixed and somewhat interwoven layer, 15—25 × 7.7—12 μ, setulae 1.3—2.2 μ high; hyphae with clamp connections, amyloid. The lamellae are rounded-adnexed, distant, rather broad; pileus glabrous; base of stipe insititious or with slight fibers which appear to be continuations of white rhizomorphs, the latter frequently with fibrillose side-branchlets. The carpophores are small.

There is also good material from Guadeloupe, coll. Duss 446, det. Patouillard (FH), "sur un vieux nid de poux de bois" (nest of termite larvae), identical with the type.

The position of this species is somewhat difficult to establish, and not without hesitation have I decided in favor of the section *Androsacei*. The other species of this section are all northern temperate or boreal species. However, the type of the epicuticular structure is not that of the *Sicci* or *Hygrometrici*. *M. proletarius* is, in certain ways, comparable with the *Rotulae* but has positively non-collariate lamellae, and the white rhizomorphs would be without precedent in that section.

Section *Fusicystides* Sing.

Marasmius isabellinus Pat. (Fig. 1).

The original collection by Lagerheim, from Ecuador (FH), is divided into two envelopes, one marked "Ravine près de Quito" which is the better collection, and shall be designated and treated as holotype. The syntype is marked "entre Quito y Seminario mayor". What is called *M. isabellinus* var. comes from Cotocallao, Ecuador; it grows on *Myrtus*, and seems to be identical with holotype and syntype. Its micro- and macroscopical characters are exactly those indicated by Singer & Digilio for *Marasmius fusicystis* Sing. in Sing. & Digilio, Lilloa **25**: 187. 1951. Patouillard's species has the priority.

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*) There are few spores in the type; these measurements given above are taken from Duss 446 (see below).

Section *Epiphylli* Kühner.

Marasmius euosmus Sing. spec. nov.

Pileus white, glabrous, convex, then irregularly flattened, membranous, 3—8.5 mm. broad. — Lamellae white, narrow, with obtuse edges, almost venose, strongly anastomosing by veins as high as the through-lamellae, forming a poroid hymenophore, adnexed; spore print white. — Stipe white, long-filiform, equal or slightly tapering upwards, insititious, pruinate, 8—13 × 0.3—0.5 mm. — Context white; odor of flowers, pleasant. — Spores 3.6—4.3 × 2—2.2 μ, hyaline,

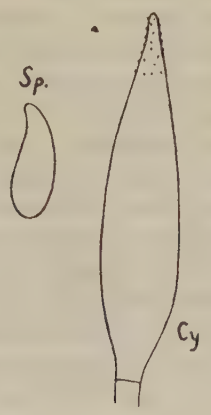

Fig. 1. *M. isabellinus*. Sp., Spores, Cy, Cystidia, both × 1000.

cylindrical, smooth; cystidia vesiculose or ventricose or clavate, hyaline, not refringent; epicutis of pileus cellular, consisting of smooth hyaline isodiametric cells; covering layer of stipe with numerous to crowded dermatocystidia, dermatocystidia thin-walled or almost so, usually clavate, but also capitate or ventricose-ampullaceous, erect, 28—40 × 8.7—11.5 μ; hymenophoral trama regular, hyaline; all hyphae with clamp connections, hyaline, inamyloid. — On a log, gregarious. Panamá Canal Zone, Barro Colorado Island, August 24, 1952, Martin & Welden, 8702 (IA).

Latin diagnosis: Pileo albo. 3—8.5 mm lato; lamellis venosis et porosis anastomosantibus, acie obtusis; stipite albo, filiformi, insititio, pruinoso, 8—13 × 0.3—0.5 mm.; odore fructuum amoeno. Sporis 3.6—4.3 × 2—2.2 μ; cystidiis vesiculosis vel clavatis vel ventricosis; epicute pilei cellulari; stipite dermatocystiis obsito; hyphis fibulatis, inamyloideis. Ad lignum.

This species differs from all known species of the *Epiphylli* in the small spores and poroid hymenophore.

Marasmius martini Sing. nom. nov.

This is a new name for *Cymatella longipes* Martin the type of which (Iowa State University Herbarium) comes from Colombia. The species was first published in Lloydia **7**: 79. 1944. The specimen is in good condition. There are inamyloid spores as described by Martin; the cystidia are rather inconspicuous and not or little projecting, about 40 μ long and about 9 μ broad, cylindrical, ventricose, or sometimes apiculate, few, but all over the hymenial surfaces; hyphae non-amyloid, with clamp connections. Otherwise as described.

The genus *Cymatella* is characterized, according to the author's type studies, by an epicutis consisting of diverticulate elements in the manner of the section *Rameales* (*Marasmiellus*); as a matter of fact, it differs from *Marasmiellus* only in the absence of a hymenophore. In the case of *Cymatella longipes* Martin, we have a form differing from *Marasmius, Epiphylli,* only in the absence of the hymenophore, but it appears impossible and artificial to distinguish a genus on this basis since in the *Epiphylli,* more than in any other group of agarics, a tendency towards reduction of the hymenophore can be noted, one that is obvious even in young specimens of European and North American representives while in the tropics further variations, even to venose-poroid hymenophore are encountered. I believe it necessary, therefore, to introduce this species in the section *Epiphylli,* but since the binomial *Marasmius longipes* is previously occupied, I propose the new name *Marasmius martini* Sing.

Marasmius carpenterianus Sing. spec. nov. (Fig. 2).

Pileus convex, then convex-applanate, obtuse, not umbilicate, whitish, 2—4 mm. broad. — Lamellae white, rather distant (twelve through-lamellae, of those one doubly forked, six singly forked, 5 simple), with 6 lamellulae, rather narrow, but not venose, except in young stage, broadly adnate. — Stipe brown, setose, insititious, under binocular pruinoso, increasingly pruinate-pubescent toward the base, longer than the diameter of the pileus, 0.1—0.2 mm. broad. — Context white, very thin. — Spores 7—7.7 × 3—4 μ, hyaline, smooth, inamyloid; basidia short; cystidia 35—37 × 10—10.5 μ, ampullaceous with widest diameter in the middle, rather numerous, hyaline, smooth, thin-walled; subhymenium subcellular; epicutis of pileus consisting of subisodiametric cells of various diameters. e. gr. 11.5—18 × 7.5—11.5 μ or larger, smooth; dermatocystidia of the surface of the stipe hyaline or more often melleous, with moderately thin walls, very versiform, usually rounded above, ampullaceous or subulate or cylindrical, etc., sometimes with a septum in the lower portion, (10)20—30 × (4)7—9 μ; hyphae of the pileus radially arranged and parallel with each other, thin-walled, those of the stipe slightly thick-

walled, not metachromatic (all uniformly deep violet to blue) in cresyl blue mounts, parallel with each other, inamyloid, without clamp connections. — On dead green leaves in tropical forest, Perú, Tingo María, Huanaco, Cueva de los Pavos, 700 m. alt., J. B. Corpenter 136, September 3, 1949, LIL.

Latin diagnosis: Pileo albo, 2—4 mm. lato; lamellis subdistantibus, soepe furcatis, satis angustis, adnatis; stipite bruneo, insititio, pruinato, 0.1—0.2 mm. lato; sporis 7—7.7 × 3—4 μ; cystidiis 35—37

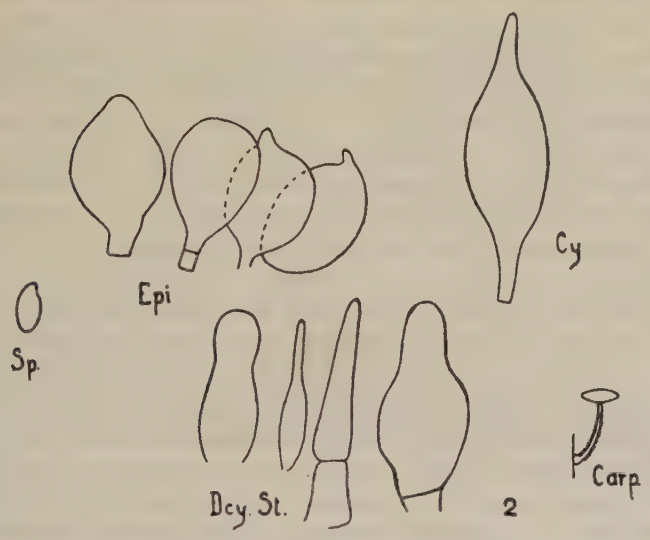

Fig. 2. *M. carpenterianus*. Sp., Spores, Epi, epicuticular cells. Cy, cystidia. Dcy.St, dermatocystidia of the stipe, all × 1000. Carp., corpophore, × 2.

× 10—10.5 μ; epicute cellulari, cellulis levibus; hyphis defibulatis, inamyloideis. Ad folia viridia emortua in silva tropicali, Perú.

This differs from *M. tremula* Vel. in smaller spores, and in more developed lamellae.

Excluded species:

Marasmius albocapitatus Petch.

This species may be interpreted as a *Marasmius,* and has indeed been published as such. It is therefore included in the descriptive part as well as in the key although, in view of its characters it belongs in the genus *Pseudohiatula* Sing. The Western variety, based on a difference in spore size was described as var. *occidentalis* Dennis. This was placed by its author in the genus *Crinipellis* from which it differs in the characters of the hairs (dermatocystidia), adnate lamellae and general aspect.

Pseudohiatula albocapitata (Petch) Sing. comb. nov.

Marasmius albocapitatus Petch, Trans. Brit. Myc. Soc. 31: 31. 1948.
Crinipellis albocapitatus (Petch) Dennis, ibid. 34: 430. 1951.
Crinipellis albocapitatus var. *occidentalis* Dennis, ibid.

Pileus white, smooth, dry, glabrous but under a binocular minutely pubescent, convex, 1—2.5 mm. broad. — Lamellae white, medium broad, well developed (five to six through-lamellae), not intervenose, entire, not intermixed, not collariate, distant, adnate. — Stipe nearly white at apex, chestnut colored below, later becoming umber at the apex, and black below, subpubescent, obliquely to perpendicularly pilose all over under binocular, 8—39 × 0.1—0.3 mm.; basal mycelium none; base insititious. — Context white, extremely thin, inodorous. — Spores 9.7—12 × 2.7—3.3 μ hyaline, smooth, eventually becoming very slightly brownish everywhere where they were in contact with the resinous matter excreted by the cystidia, thin-walled, oblong-subcylindrical and needle shaped, applanate on inner side when seen in profile, inamyloid; basidia 18—19 × 5—6 μ, 4-spored; cystidia moderately numerous but very conspicuous, apparently of the metuloid type, both on edges and sides of the lamellae, 30—50 × 8.8—11 μ, on young carpophores mostly 33—38 × 9—10 μ, with thin to thick walls, hyaline, cylindrical to ventricose, always broadly capitate, some not incrusted, others incrusted at the apex with a succinous resinous incrustation, inamyloid; basidioles fusoid; hymenophoral trama consisting of filiform rather loosely arranged hyphae which are slightly gelatinized, thinwalled, not opaque, hyaline and smooth; epicutis of the pileus formed by a hymeniform layer of vesiculose elements and some scattered dermatocystidia and some rare metuloid elements which are inconstant and may be absent in some caps, vesiculose elements hyaline, smooth, usually with an amorphous or globose body inside, broadly rounded above or else somewhat apiculate-protracted at the apex, but the apex itself broadly rounded, the pedicel separated from the main body by a septum and then main body subisodiametric, or else not separated and then the length of the cell much superior to the breadth, varying in this regard from e. gr. 14 × 10 μ to 22 × 8.8 μ, in general 13—22 × 5.5—13.2 μ, usually with thin walls, but here and there, a thick walled element may be observed; covering layer of the stipe interrupted and not continuous, consisting of hyphal hairs and dermatocystidia, the former hyaline where the context hyphae of the surface are hyaline, but brown where they are brown, cylindrical or almost so, short with somewhat thickened walls, smooth, erect or oblique, arising from the surface hyphae of the trama, 8—13 × 2.7—3.7 μ; dermatocystidia of pileus and stipe usually with swollen base or ventricose (so on the pileus), there 6—6.5 μ broad, filiform or slightly

tapering upwards above, capitulate or not, capitulum if present 3.5—4 μ broad, otherwise sometimes with sterigmatoid prongs (e. gr. 4.4 × 1.8 μ), otherwise rounded at the tip, thinnest portion 1.5—2.5 μ in diameter, length 33—39 μ; metuloid dermatocystidia of the pileus fusoid to subulate, acute, e. gr. 28 × 5.5 μ; all hyphae with clamp connections, inamyloid. — On fallen fresh and rotting leaves of various dicotyledoneous trees and shrubs in tropical coastal forest.

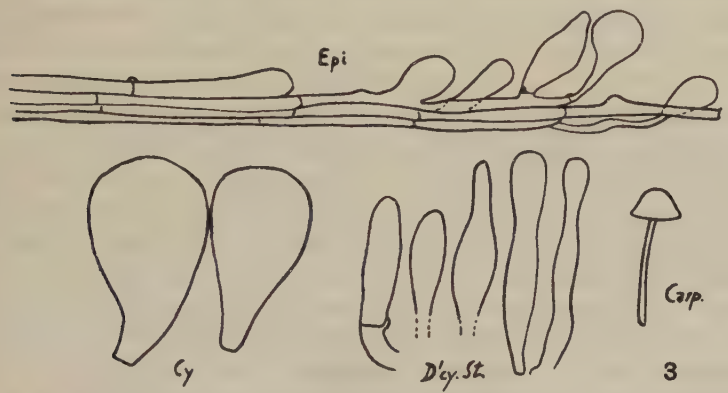

Fig. 3. *M. oligocystis*. Epi, section of a fragment of the cuticle showing fragmentary epicuticular layer, × 1000. Cy, cystidia, × 1000. Dcy.St, dermatocystidia of the stipe, × 1000. Carp., carpophore, nat. size.

Brazil, est. Rio de Janeiro, Angra dos Reis, Oct. 1, 1952, Singer B 426, F.

This coincides macroscopically as well as far as the description is concerned, with the type and type diagnosis by Petch and with the specimens and description given by Dennis. I have not analyzed the type specimen deposited by Petch, from Ceylon (K), but I have no doubts concerning its identity.

Section *Alliacei* Kühner.

Marasmius podocarpi Sing. in Sing. & Digilio.

Nothing can be added to the diagnosis of this characteristic species.

Marasmius oligocystis Sing. spec. nov. (Fig. 3).

Pileus ochraceous brown, with whitish central disk, dry but possibly hygrophanous, glabrous but very slightly pruinate under a lens, smooth, convex, 6 mm. broad. — Lamellae whitish, becoming chestnut when dried, subfree, narrow, close to subclose. — Stipe cinnamon, ochraceous brown, to fuscous-ochraceous at the apex, but distinctly pruinate all over, not insititious, filiform, equal, 17 × 0.8 mm.; basal

mycelium white. — Context almost none, inodorous. — Spores 5.3—6 × 2.3—3 μ, hyaline, smooth, inamyloid, guttiform, or elongated cylindrical, rarely reaching 6.5 μ in length; basidioles fusoid; basidia clavate, relatively short, 15.5—18(20) × 4.3 μ, 4-spored; cystidia on edges of lamellae very conspicuous but very scattered, saccate to vesiculose-clavate, smooth, hyaline or subhyaline, 20—30 × 9—15.7 μ; cuticle of pileus formed by a hypodermium which is a cutis consisting of cinnamon to pale chestnut colored but with fine and very inconspicuous pigment incrustation, the uppermost layer of hyphae frequently branching into broader, repent, ascendant and erect ventricose to clavate or globose-pedicellate cystidioid cells forming an interrupted neither palisadic nor hymeniform epicutis corresponding to that of *Marasmius platycystis* Sing. (*Alliati*), these epicuticular cells measuring 15—26 × 7—9 μ; covering layer (pruina) of stipe consisting of dermatocystidia which are most frequently subcapitate as in *M. chordalis* and *M. elongatipes,* but also cylindrical, ventricose, or ampullaceous, 20—30 × 5—8 μ; hymonophoral trama hyaline or subhyaline, regular; hyphae of stipe parallel; all hyphae with clamp connections, inamyloid. — On decaying leaves in tropical forest, Brazil, Est. Paraná, near Paranaguá, Singer B 403, (F), September 1952.

This differs from other tropical species by the fragmentary epicutis. such as has been observed in species like *M. platycystis* Sing. The only species that might be considered as possibly close to *M. oligocystis,* is *Gymnopus subagricola* Murr. The type from Florida (FLAS) is now sordid palc buffy fulvous on the pileus, with adnatodecurrent lamellae; the pileus is applanate to slightly centrally depressed. Spores 5.5—7 × 2—3 μ, smooth, hyaline, inamyloid; basidia 18—20 × 6—6.7 μ; cheilocystidia vesiculose, 20—28 × 8—12 μ; cystidia similar but larger; epicutis now rather deteriorated and apparently not quite continuous (?), but cells similar to the cystidia were observed, also some with more fusoid to clavate shape, one even branched, 7—12 μ broad, many collapsed; hyphae with clamp connections, inamyloid. The material is difficult to analyze; I am not fully certain that the epicuticular cells observed are not either remainders of a hymeniform epicutis, or, on the contrary, dislocated portions of a hypodermium, or perhaps even foreign. *G. subagricola* must be considered as a species of doubtful position as long as topotypical material has not been collected. But even assuming that the epicutis has the same structure as in *M. oligocystis,* there are still some remarkable differences between the two species, in the first place as far as the color of the pileus is concerned, also in the colors of the stipe and in the attachment of the lamellae, and probably in the characters of the cystidia although, because of the condition of

the type of *G. subagricola,* a very exact comparison cannot be made. Consequently, I consider my Brazilian species as new:

M. oligocystis Sing. Pileo ochraceo-brunneo, centro albido; epicute fragmentaria, ex elementis vesiculosis vel subvesiculosis haud hymeniformiter dispositis consistente; cystidiis ad aciem lamellarum vesiculosis; dermatocystidiis stipitis plerumque subcapitatis; lamellis subliberis; stipite apicem versus cinnamomeo vel ochraceo-brunneo vel fusco-ochraceo, mycelio basali albo; hyphis inamyloideis. Ad folia dejecta in silva tropicali litorali, Paranaguá, Brasiliae, Singer B 403.

Marasmius ionides Pat.

The type from Guadeloupe, W. I. (FH) is Duss 539. Aside from the data correctly given by Patouillard, we observe hyaline, smooth spores, 5.5—7.2 × 3.2—3.8 μ, with or without suprahilar depression, inamyloid. The hyphae are also inamyloid. This is a good species, characterized by the presence of cystidia and by the violet pigment present in freshly dried material.

Agaricus smaragdinus Berk. Hook. J. Bot. **8**: 131.

The type from "Panuré" (Ipanuré or Sao Jeronimo), Amazonas, Brazil, was collected by S p r u c e who indicates (in sched.) "Viridis". It is rather well preserved (K). It has the same characters as the species described by D e n n i s (no. 274, K) as *Omphalina viridifusca* (Berk. & Curt.) and which is based on the type, *Marasmius viridifuscus* Berk. & Curt., from Cuba. We have also observed the characteristic epicutis of broadly clavate cells forming a hymeniform layer; spores non-amyloid; hyphae non-amyloid with clamp connections. The hypodermial layer appears slightly pseudo-amyloid, but this is probably an error of interpretation since the color effect is apparently due to a combination of pigment (which heavily incrusts the horizontal hyphae underneath the epicutis) and staining. The spore print is white. The hyphae of the stipe are running parallel and are slightly thick-walled and somewhat melleous now, with clamp connections and inamyloid. The carpophores have the same aspect in the type of *A. smaragdinus, M. viridifuscus,* and in D e n n i s 274. This should be known as **Marasmius smaragdinus** (Berk.) Sing. comb. nov. It is a characteristic species because of its color and habit. Furthermore, it is additional proof that the true *Omphalinae* do not occur in the tropics.

Excluded species.

Marasmius cohortalis var. *hymeniicephalus* (Speg.) Sing. (and related forms) may be looked for in this section since the Melzer reagent does not always give strongly positive

reactions. However, these forms belong obviously to the stirps *Niveus*, section *Globulares*, see there.

Collybia cinnamomea Dennis Tr. Brit. Myc. Soc. **34**: 436. 1951. (Fig. 4).

This species is mentioned here because its characters may cause doubts as to whether or not it belongs in *Marasmius*. Once admitted in this genus, it would be looked for in the section *Alliacei*. However,

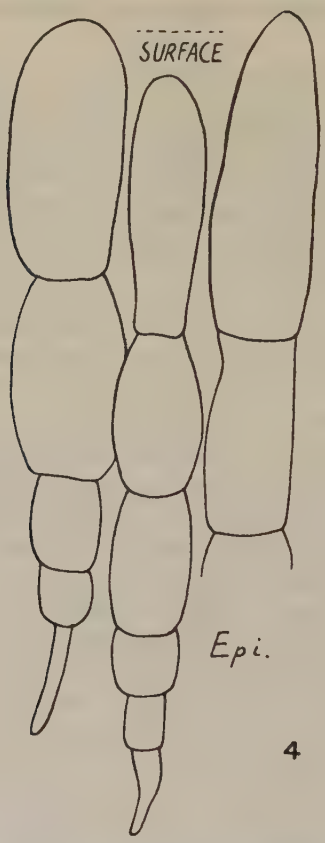

Fig. 4. *Pseudohiatula cinnamomea*. Epi, hyphae forming the epicutis, ×1000.

considering all its characters, it seems somewhat removed from the other species of this section, and should, in my opinion, be transferred to *Pseudohiatula*, as **Pseudohiatula cinnamomea** (Dennis) Sing., comb. nov. This makes it necessary to emend the diagnosis of *Pseudohiatula* slightly so, that dermatocystidia or hairs must not necessarily be scattered among the hymeniform epicutis which, as in this case, may be entirely replaced by such hairs.

On formal grounds, this might be considered a *Xerula* (because it may key out with that genus), but the species does not seem to have any close relations with that genus. In habit, it resembles *Macrocystidia* and has the broad cystidia of that genus; however, the spores are white in print.

The type from Trinidad (K) is well preserved but can hardly be considered a *Collybia* in the way the genus is understood by me. Although it is also somewhat atypical in *Pseudohiatula*, it seems to be the best solution to place the species there.

Spores ellipsoid, smooth, hyaline, nonamyloid, 5.8—7.3 × 3.7—

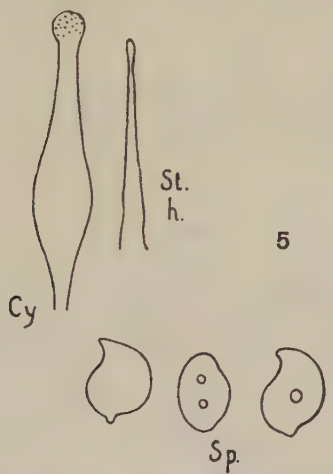

Fig. 5. *M. chordalis.* Cy., cystidia, × 500. St.h., hair of the stipe, × 500. Sp, Spores, × 1000.

4.8 μ; basidia 29—30.5 × 6.5 μ, 4-spored, few 1-2-3-spored; epicutis a trichodermial palisade, consisting of very short although not globose cells, the second-last of the chains e. gr. 29 × 17.5 μ, the terminal cells vesiculose clavate or tapering upwards to an always very broadly rounded apex, e. gr. 43 × 16 μ with cinnamon membranal and intracellular pigment, the latter dissolved, the former not forming incrustations (KOH), the basal cell thinner and more elongated, directly arising from a cutis formed by the hypodermium which is distinctly hyphaous, hyphae sometimes with incrusting cinnamon pigment plates, hyaline context hyphae beneath; all hyphae inamyloid and with clamp connections.

Extralimital species.

In order to compare the species admitted here, I include type studies on two northern temperate species, one European, the other American.

Marasmius chordalis Fr. (Fig. 5).

The type or at least authentic material was distributed by Rabenhorst. This is identical with the current conception of the species and with material collected by me in Artubasz, Siberia (North Altai). Although nothing similar has been observed in the neotropics, I give a description of my collections for the sake of comparison with similar American species.

Pileus pale chamois, yellow-gray-pallid, subsulculate at margin, convex then applanate, papillate, about 15 mm. broad. — Lamellae pure white, distant, adnate; spore print white. — Stipe pallid on apex,

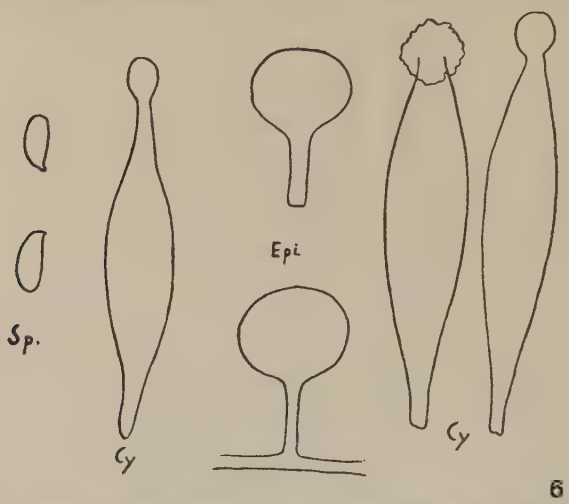

Fig. 6. *M. elongatipes*. Sp, spores. Cy, cystidia. Epi, cells of the epicutis. all × 1000.

otherwise reddish brown, entirely pallid-pruinose. — Context whitish, inodorous. — Spores 8.3—8.5—11 × 6.2—6.5—7 μ, ellipsoid, relatively broad, with a small suprahilar depression, with one to several small oil droplets, sometimes with a tendency toward lemon or almond shape, thin-walled, nonamyloid, hyaline; basidia 38—50 × 7—10.8 μ, 4-spored; cystidia 45—80 × 10—17 μ, ventricose below, capitate or subcapitate above (apex 7.5—8.5 μ broad, neck 5.8—7.5 μ broad), with finely granular contents in the capitulum only or everywhere; epicutis cellular, cells 10—14 μ in diameter; hairs of the stipe, forming the pruina, hyaline, with only slightly thickened wall, e. gr. 54 × 3.5 —7.5 μ, subulate-effilate, hyaline to pale brownish in the Melzer; hyphae in pileus and stipe hyaline, nonamyloid. — On vegetable débris, preferably of Pteridophytes.

Marasmius elongatipes Peck (Fig. 6).

The type agrees well with material preserved at the Farlow Herbarium and compared by Burt with authentic material as well as

with material collected by the author. This is a very common Eastern North American species, and it is assumed that it does not reach the tropical zone. It is here redescribed for the sake of comparison with tropical species.

Pileus fulvous, slightly striate, glabrous, dry convex, then applanate, 5—10 mm. broad. — Lamellae pallid, adnate to adnexed, somewhat ventricose, moderately broad, moderately close, intermixed. — Stipe pallid at the apex, brownish tomentose all over, the tomentum moderately dense, but conspicuous at the base where it is rather dark brown, straight, tapering upwards, at least 50 mm. high and 2 mm. broad at the base; — Context, white, thin, almost blackish brown in stipe, inodorous. — Spores 7—9.7 × 3—4 μ, nonamyloid, hyaline,

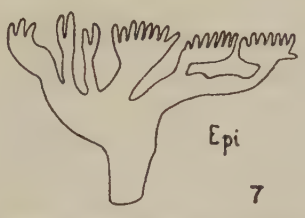

Fig. 7. *M. dispar.* Epi, broom cell of epicutis of pileus, × 1000.

smooth; basidia 28—31.5 × 6.5 μ, 4-spored; basidioles fusoid; cheilocystidia 28.5—55 × (5)6.8—10.5 μ, fusoid, very frequently capitate; epicutis formed by a hymeniform layer, consisting of globose pedicellate cells 20—42 × 10—22 μ, many with rather thick walls, smooth, hyaline but often fulvous from pigment plates; pruina and tomentum of stipe consisting of hairs much like those of *Crinipellis,* but not pseudoamyloid, with very thick walls, obtusely rounded above, 5—6.5 μ broad, at the base intermixed with thin-walled hairs, not or little septate; all hyphae with clamp connections, nonamyloid. — On rotting leaves and on chips of wood.

This is said to be the same as *Marasmius pyrrhocephalus* Berk., but material of the latter was not available.

Section *Hygrometrici* Kühner.

Agaricus dispar Mont. (Fig. 7).

The type from Rio de Janeiro (PC) was not studied, but authentic material from French Guyana, Leprieur 991, 992 (FH) was analysed. This seems to be in close agreement with the type (see type analysis by Dennis, Kew Bull. 1951: 156. 1951). Spores (FH) 12 × 3.5 μ, smooth, inamyloid; epicutis of pileus consisting of a hymeniformly arranged layer of broom cells which are yellow, *Clavariella*-shaped and often rather ramose, erect, more hyaline toward the base, with golden yellow erect, rarely slightly diverticulate 2—5.5 μ long, setulae which make the cells appear to be crested; hyphae hyaline, inamyloid. The

color is as indicated by Montagne, center of pileus with a button-like papilla in most carpophores; stipe light umber and smooth, glabrous, shining, insititious.

Very similar material exists at FH: Duss 1394, det. Patouillard, from the Bois des Bains Jaunes, on all kinds of rotting leaves, also Duss no. 443 from the same locality. Some pilei are distinctly more ochraceous-rusty than the Guyana material. This may be con-

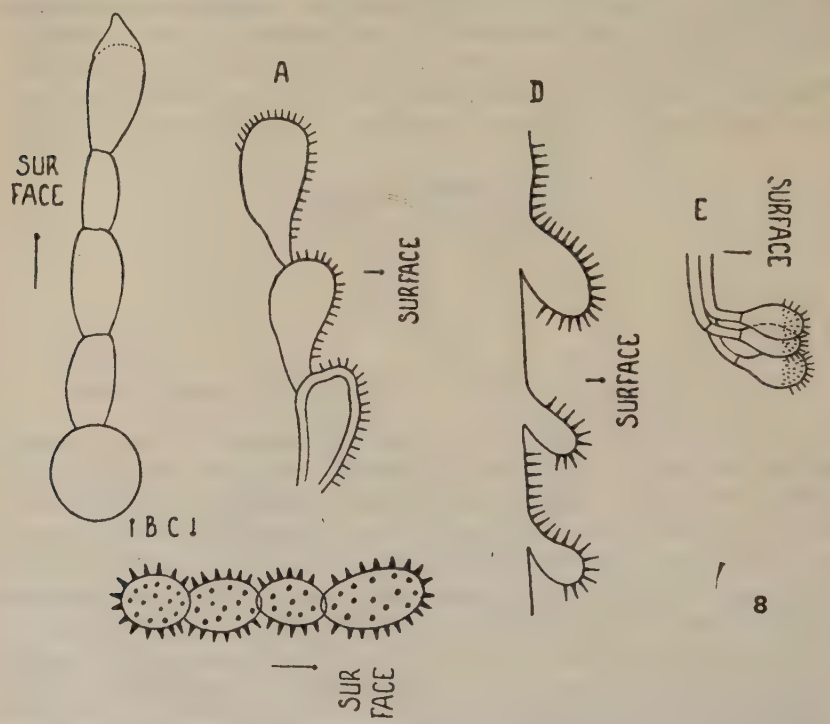

Fig. 8. *M. magnoliae*. A—E elements of the epicutis. A, outer chein in a fasciale forming a hair. B inner chain of a facicle forming a hair. C, solitary chain forming a hair. D and E, surface of pileus between hairs. All elements ×1000.

sidered the type of a subsection characterized by broom cells of the *Sicci*-type.

Marasmius ilicis Sing.

There is nothing to be added to the original diagnosis, Lilloa **26**: 142. 1953.

Marasmius crescentiae Murr.

I have not studied the type, but the analysis published by Dennis (Kew Bull., p. 198, 1951) leaves no doubt about the position of the species.

Marasmius magnoliae Sing. (Fig. 8).

There is nothing to be added to the original diagnosis, Mycologia **37**: 435. 1945.

Section *Apus* Sacc.

This section was originally meant to accomodate all lateral or eccentric *Marasmii* in the widest sense. When I restricted it to species with hymeniform epicutis made up of broom cells and with inamyloid trama, I added: "It is not quite certain whether any of the species in Sylloge 5: 567—569 belong here." Consequently, I have since then endeavored to study as many of these species as possible. The result may be summarized thus:

M. spodoleucus Berk. is a *Plicatura.*

M. ignobilis Berk. & Br. is probably a *Marasmiellus.*

M. epochneus Berk. & Curt. is a *Marasmiellus.*

M. galeatus Berk. & Curt. is a *Chaetocalathus.*

M. spaniophyllus Berk. is a *Marasmius,* see below.

M. merulinus Berk. & Curt. is a *Campanella.*

M. nidulus Berk. & Curt. is a *Chaetocalathus.*

M. arachnoides Berk. & Curt. is a *Rhodophyllus.*

M. concolor Berk. & Curt. is a *Marasmiellus; sensu* Berk. & Br. it is a *Crepidotus;* sensu Sing. & Digilio it is a *Marasmius,* see below.

M. haematodes Berk. & Curt. was analyzed by Dennis (Kew Bull. p. 397, 1951) but without conclusion. Not a *Marasmius.*

M. sabali Berk. is a *Marasmiellus.*

Consequently, *M. spaniophyllus* is the only species belonging in this section as defined by Singer (Lilloa **22**), and is herewith selected as lectotype of section *Apus* Sacc.

Marasmius sessiliaffinis Sing. spec. nov.

Pileus light brown to pale yellowish fuscous (due to a fuscous punctation from clusters of dark brown broom cells on hyaline ground), smooth, elliptical or circular or with a lateral sinus where the stipe is inserted, 2—13 mm. broad when fresh. — Lamellae white or whitish, irregular, four to seven through-lamellae and one or two, rarely more lamellulae, with smooth interlamellar spaces, or more rarely with few incomplete venose anastomoses, distant, moderately broad to rather narrow, free, more rarely some adnexed to adnate; spore print pure white when fresh, but becoming gradually yellowish in the herbarium. — Stipe deep badious-fuscous, subglabrous, very short and strongly curved, lateral. — Context extremely thin. — Spores 7.8—9.2 × 5—5.4 μ, smooth, hyaline, ellipsoid, inamyloid; basidia 27 × 6.8—7.8 μ, 4-spored; cystidia and cheilocystidia none; epicutis of pileus consisting of a hymeniform layer of broom cells which are clavate, hyaline below, setulae hyaline in some, fuscous in other

cells, varying from simple to forked and from about 2.5 to 8 μ high, entire cell e. gr. 21.5 × 8.5 μ; hyphae hyaline, non-amyloid, with clamp connections. — On various stems and twigs and branches among forest litter, gregarious. Panamá, Canal Zone, Barro Colorado Island, Martin & Welden 7606, July 11, 1952 (IA and F); also Martin & Welden no. 8406, August 15, 1952 (ibidem).

Latin Diagnosis: Pileo dilute fusco, 2—13 mm. lato; lamellis albis, distantibus, plerumque liberis; stipite obscure badio-fusco, brevissimo, curvato, laterali; — sporis 7.8—9.2 × 5—5.4 μ; cystidiis nullis;

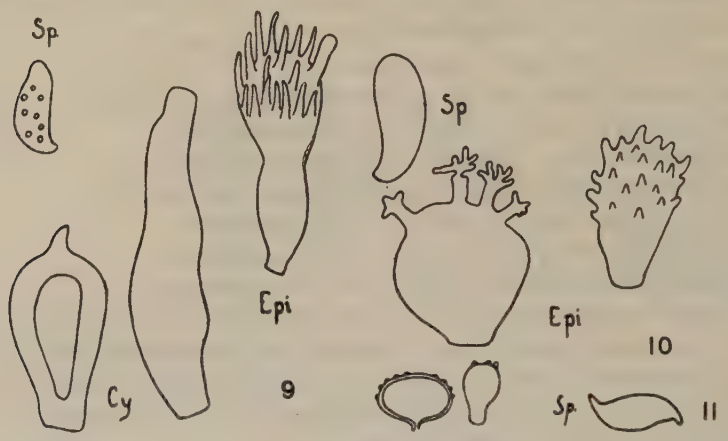

Fig. 9. *M. linderi*. Sp., Spores. Cy, cystidia. Epi, broom cell of the epicutis, all × 1000.

Fig. 10. *M. spaniophyllus*. Sp., spores, × 1500. Epi, elements of the epicutis, the upper two × 1500, the lower two × 500.

Fig. 11. *M. pampicola*. Spores, × 1000.

epicute ex elementis superne setulosis consistente, setulis partim hyalinis, partim fuscis; hyphis inamyloideis, fibulatis. Ad frustula in silva tropicali. Panamá.

This species is close to *M. sessilis* Pat., an Asiatic species the type of which (FH) has slightly smaller spores, less pigment, and lacks a stipe. *M. sessilis* has never been observed in the neotropical forest. *M. linderi* (Fig. 9) Sing. has larger spores, and pleurocystidia. The type (FH) comes from Liberia, Africa. Cystidiate species of this section have not been found in South America until now.

Marasmius spaniophyllus Berk. (Fig. 10).

The type from Natividade, Est. Minas Gerais, Brazil (K) was collected by Gardner on dead woody sticks. Spores 10.5—12.3 × 5.3—6 μ, smooth, hyaline, inamyloid; slightly concave on inner side when seen in profile; cystidia on the sides of the lamellae none; cheilocystidia similar to broom cells; epicuticular broom cells arranged hymeni-

formly, globose or subglobose to clavate-vesiculose, varying from 14.5×14 μ to 17.5—20×9.8—13.8 μ, the upper end covered with somewhat diverging (like in *Marasmius rotalis*) but often only apical short verruculose to long and diverticulate setulae, the verruculose ones about 1—1.5 μ high, the others much higher with about 1 μ long diverticules, subhyaline to deep melleous, wall up to 1.5 μ thick; hyphae with clamp connections, inamyloid.

This species was also found in Argentina. It is therefore possible to give a complete redescription of this species; however, since the data of the analysis of the type can easily be added to the diagnosis of *M. iguazuensis* Sing. in Sing. & Digilio (Lilloa 25:189. 1951), we shall not repeat the published data. *M. iguazuensis* differs from the type only in slightly smaller spores. I believe that in *Marasmius,* a small difference of this order (9—11×4.5—4.8 μ against 10.5—12.3 ×5.3—6 μ) cannot have much weight.

M. spaniophyllus differs from *M. sessiliaffinis* in different color („Adobe", „cracker" M&P) of pileus and lamellae (the latter are white in *M. sessiliaffinis*), and in larger spores.

Section *Neosessiles* Sing.

A sectione *Apus* Sacc. differt tramate amyloideo. Typus: *M. neosessilis* Sing.

Marasmius neosessilis Sing. spec. nov.

Pileo armeniacoo, 1—2.5 mm. lato; lamellis albis, tribus vel quattuor; stipite nullo; sporis 9.5—10×4—4.8 μ; epicute pilei hymeniformiter disposita, ex elementis granulosis vel diverticulatis efformata; hyphis fibulatis, amyloideis (pseudoamyloideis). Ad ramulos emortuos, Cataratas del Iguazú, Misiones, Argentina.

A descriotion in Spanish was given in the Pródromo by Singer & Digilio under the name *„Marasmius concolor* Berk. (?)". An analysis of the type of *Marasmius concolor,* however, has shown that this species belongs to *Marasmiellus.*

Section *Globulares* Kühner.

Gymnopus setulosus Murr.

The type was analyzed by A. H. Smith. The species belongs in the group *M. torquescens* and *M. delectans,* the former defined by Kühner, the latter studied by this author, and both extratropical. The type of *G. setulosus* comes from Jamaica, W. I. (NY). It was transferred to *Marasmius* but the new combination is homonymous with *Marasmius setulosus* Murr. *M. setulosus* Murr. is a synonym of *M. cohaerens* (see section *Sicci*). Consequently the new name *Marasmius murrillianus* Sing. Lilloa 25:488. 1951 was introduced for the species originally described as *Gymnopus,* and belonging in section *Globulares.*

Heliomyces plumieri Lév.

This was doubtfully included in *Heliomyces* by Léveillé who based his species on „Fungus crenatus tenuissimus niveus" Plumier, p. 144, pl. 167, fig. C. This is very similar to a collection from the same general region (Antilles), viz. Guadeloupe, collected by Duss and referred to Léveillé s species by Patouillard (FH). It has remarkably large spores, 14.5—15.5 × 4.5—5 μ, hyaline,

Fig. 12. *M. vieyasii.* C. Carpophores, at left with the rhizomorphs cut off (they are about 12 times. longer than shown here), at right a pileus seen from below; one half natural size; b, basidia, × 420 μ; spores, one old and bicellular, the one at the right beginning to germinate, × 750 — From a drawing by Viegas, showing details of the fungus in culture.

smooth, inamyloid; basidia likewise large, 42—45 × 7.5—8 μ; cystidia not observed; epicutis hymeniform, consisting of globose, pedicellate cells which are hyaline, about 14.5 μ in diameter; hyphae amyloid.

Collybia pampicola Speg. (Fig. 11).

This species has been analyzed and redescribed by Singer and Singer & Digilio (Lilloa **25**: 464, 491, 194, 1951). Nothing can be added to these previous accounts.

Marasmius viegasii Sing. in Viegas. (Fig. 12).

Pileus pl. 13 C 11 (M & P, about cinnamon tawny), glabrous, furrowed-sulcate almost to the center, at first globose, then becoming

cinvex, gradually flattening out and eventually more or less depressed, or concave, sometimes, especially in age, umbonate, 60—70 mm. broad. — Lamellae concolorous with pileus, broad (5 mm. broad), very distant, little or not anastomosing, adnexed or adnate; spore print white. — Stipe deeper colored than the pileus, hollow, fibrillose-tomentose below in continuation of the basal tomentum, longer than the diameter of the pileus, slightly tapering upwards and sometimes also short-tapering into the base, sometimes spirally-twisted, glabrous to subglabrous above, about 5 mm. broad; basal tomentum white; arising from white rhizomorphs. — Context thin, tough. — Spores about 16×4 µ when fully mature (spore print), cylindrical to subfusiform, but the inner side applanate to slightly concave in profile, eventually developing cross-septa and easily germinating on paper, thin-walled, smooth, hyaline, non-amyloid; basidia 4-spored; cystidia none; tramal hyphae amyloid, with clamp connections; epicuticular elements arranged hymeniformly, smooth, more or less clavate, hyaline, pedicellate and often strongly shortened in mature material and then subisodiametric entire, arising from thinner hyphae which form a trichodermial palisade of which the clavate elements are the terminal cells, beneath the trichodermium, there is a cutis, formed by the hypodermium; setae none. — Carpophores obtained from pure culture at Campinas, Est. São Paulo, Brazil, by A. P. Viegas. April 1, 1950, from material collected on woody matter also at Campinas, where the type is preserved. The species is apparently common, but rarely found fruiting; it is pathogenic on Coffee.

The only other species, in this section, which has spores as large as *M. viegasii,* is *M. plumieri.* The latter differs in being white. The general aspect of the carpophores reminds one somewhat of *Marasmius caryotae* sensu Sydow. However, the type from Ceylon (K) was not studied by me, inasmuch as Berkeley describes it as „Albido-luteus", observing that the color of the fresh fungus is pale stramineous which seems to exclude *M. viegasii* automatically.

Marasmius rhyssophyllus Mont. in Berk.

The type was studied by Patouillard and Dennis. I have studied identical material collected by Duss, no. 1769 „sur bois de gommier" in Guadeloupe (FH), and looked up the type only macroscopically (P, K). The Duss material is in good condition. It is said to be „jaune de cire à l'état frais" and „stipe et chapeau légèrement pulverulents" (Duss). Patouillard adds that this differs from the type „par son pied noir et brillant ot non fauve et terne, et par ses lamelles plus étroites, à trabécules moins developpées." The spores are here inamyloid, smooth, hyaline, $7—8.3 \times 3.3—3.8$ µ; cystidia none seen, seem to be absent; epicutis cellular; trama amyloid because of strongly amyloid thick-walled hyphae in both pileus and stipe;

besides, there are also inamyloid to weakly or strongly amyloid thin-walled hyphae in the pileus and in the hymenophoral trama. I believe that all these collections are identical with each other. Dennis (Trans. Brit. Myc. Soc. 34: 473, 1951) gives a complete description under the name *Dictyoploca rhyssophylla* (Mont.) Baker & Dale, and thinks that *Dictyoploca heterophylla* Heim is the same species. It may be remembered here that the „genus" *Dictyoploca* has never been validly published. Montagne was right in hesitating when proposing it tentatively since the genus is not needed.

Marasmius oreades (Bolt. ex Fr.) Fr. occurs in Southern South America, but has been introduced, probably with grass seeds; it is not a native element.

Marasmius heliomyces Murr.

This is a characteristic species; the type from Florida (FLAS) was analysed and fresh material was gathered and compared with the collection. A redescription is given here:

Pileus young „mummy brown" to fuscous black, soon gradually whitish toward the margin, or inversely „mummy brown" all over excepting the center where the color is sharply changed to much paler, eventually often brownish gray or mouse gray excepting a frequently present but not constant pallid zone between disc and margin, leaving the center zone characteristically star shaped, substriate then deeply long rugose-sulcate radiately, sometimes even rimose sometimes undulate, glabrous, dry or subhygrophanous (drying to „tilleuil buff" R.), hemispherical to convex, then convex-applanate or subapplanate and usually umbilicate, 20—40 mm. broad. — Lamellae varying from white (especially in youth) to „cartridge buff" (R.), especially in age and when dry, at first ascendant, later horizontal and mostly subventricose, broad, 4—8 mm. broad, distant to very distant, deeply emarginate and adnexed, or subfree. — Stipe hyaline, then white, with chestnut colored base, later the base becoming between „burnt sienna" and „mahoganny brown" (R.), later the chestnut portion reaching higher up, or with an intermediate citrinous pallid middle zone, but on drying the chestnut color often disappearing and replaced by a cinereous or pale umber color, glabrous, shining, smooth, equal or more rarely tapering downwards, tubulose, 40—60 × 3—(5) mm.; basal mycelium abundant, striking, white. — Context thin; odor none, or weakly of *Marasmius oreades*, but sometimes, when quite fresh, either rancid or of honey, but these latter odors soon disappearing. — Spores (5.2) 6—8.8 × 2.8—3.7 μ, smooth, hyaline, non-amyloid; cheilocystidia vesiculose, mostly broadly rounded above, few somewhat ampullaceous, some broadly subcylindric, most frequent clavate-vesiculose, hyaline, like the elements of the epicutis, smooth, e. gr. 9.8—18 μ broad; cystidia on

sides of lamellae none; epicuticular elements like cheilocystidia, smooth and hyaline in NH_4 OH; hyphae of context hyaline, strongly amyloid. — On the base of stumps, on rotten trunks of wood, and also on dead leaves, solitary or gregarious. Florida, Alachua Co., Gainesville, type. — Highlands Co., Highlands Hammock State Park, August—September 1942, Singer F 73, F 416, F 513 (FH). — Dade Co., Matheson Hammock, October 20, 1942, Singer F 1152 (FH).

The form occurring in Southern Florida has less chestnut stipe, more hygrophanous pileus, honey-odor, and may represent a special more thermophilous race, or species.

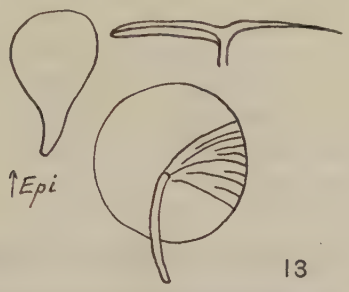

Fig. 13. *M. niveus*. Carpophores from below and in section, × 1. Epi, element of the epicutis of the pileus, × 1000.

Marasmius niveus Mont. *M. albogriseus* (Peck) Sing., and *M. cohortalis Berk.* (Stirps *Niveus*).

The type of *M. niveus* (Fig. 13) comes from French Guyana (P) and was studied by Dennis who kindly permitted me to use his notes. These confirm that the type is identical with material collected as *Collybia nivea* (Mont.) Dennis, and described by Dennis from Venezuela, and with material collected by Vargas, and determined and annotated by Singer. Both these collections were restudied by me.

As for the macroscopical data, I refer to Dennis's description (l. c. p. 434). My specimens are medium sized to rather large, thin, with smooth and glabrous chestnut brown or cinnamon brown stipe which has a tendency (as in *M. heliomyces*) to become more umber on drying, distant and moderately broad, not intervenose lamellae, radially rugose-sulcate margin of the pileus; the latter remaining white in the herbarium if properly dried. The basal mycelium is white or whitish.

Spores 5.3—8.2 × 3—3.8 μ (fully mature in the Peruvian material where many spores became one- to two-septate, separating a small cell at the apex and sometimes and equally small cell at the base of the spore as in the closely related *M. arborescens*), smooth, hyaline, inamyloid, ellipsoid-oblong in frontal view, mostly applanate on the

inner side when seen in profile; basidia 4-spored; cystidia none; cheilocystidia not studied (present?); epicuticular cells smooth, hyaline, globose-pedicellate to vesiculose-clavate, about 29 μ long and 11.5—13 μ broad, hymeniformly arranged; hyphae hyaline, inamyloid to amyloid, or all amyloid (but often slowly so) in the pileus and hymonophoral trama (which is regular), strongly amyloid in the tissue of the stipe (apex), all with clamp connections. — On leaves and débris in stands of tropical vegetation, Venezuela, Rio Chacaito, Dennis 265 B (K) — Perú, Sahuayaco Dept. Cuzco, prov. Convención, 1200 m. alt., Vargas, comm. Singer, LIL (Univ. Nac. Cuzco no. 6315).

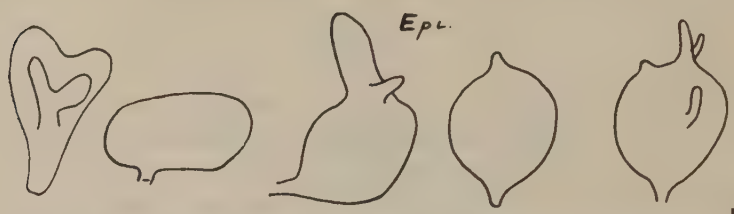

Fig. 14. *M. cohortalis*. Elements of the epicutis of the pileus, × 1000.

This differs only slightly from a series of forms which are here combined as varieties of the oldest name *Marasmius cohortalis* Berk. The forest-inhabiting South American and Floridian forms of this species differ from *M. niveus* only in sulcate margin and more or less strongly intervenose lamellae. Consequently, all the varieties of *M. cohortalis* and *M. niveus* Mont. itself are here combined to form the stirps *Niveus*. *M. cohortalis* in the wider sense (excluding *M. niveus)* has been redescribed several times, as *Collybia hymeniicephala* Speg., as *M. alachuanus* Murr., and as *M. albogriseus* var. *pseudocollinus* Sing. & Digilio ad int. However, all these synonyms refer to distinguishable and apparently constant forms; therefore, instead of lumping them together as we did in the „Prodromo . . .", we find it necessary to redescribe them, form by form, variety by variety, in order to sort the pertinent data for a monograph of the genus. This is necessary inasmuch as further comparative studies seem to indicate that *M. albogriseus* (Peck) Sing. can be separated, taxonomically, from the tropical species and forms, as shown in the keys.

1. *M. cohortalis* Berk. (Fig. 14).

Pileus „mellow glow" to „Inca gold" in the center, watery white on the margin, hygrophanous, pure white on the margin and whitish to yellowish cinnamon white on the disc when dry, sulcate or rugose in a zone about 2—3 mm. broad from the margin inwards, glabrous, not viscid, convex to convex-umbonate in age convex with slightly depressed-umbilicate center, eventually sometimes applanate and

umbilicate, sometimes somewhat eccentric, 14—23 mm. broad. — Lamellae pallid to pl. 9 D 3 (M&P, pale ocher-cream), rather narrow to moderately broad (2—2.8 mm. broad), moderately close to distant, strongly intervenose in the larger carpophores, less or not at all so in the young and small carpophores, adnate. — Stipe white at apex, chestnut color below- with gradual (not abrupt) transition, entirely light castaneous-cinnamon when dried, finely pruinate, glabrescent in age, hollow, equal, sometimes somewhat eccentric, 36—42 × 1.2—2 mm.; basal tomentum whitish, becoming sordid when dried. — Context whitish, watery when wet, partly concolorous with the surface (lower portion of stipe), almost inodorous. — Spores 7—8.3 × 3 µ, oblong-ellipsoid, smooth, hyaline, inamyloid; cystidia none; cystidioles or pseudoparaphyses present but scattered, „empty", basidiole-like but sometimes with slightly forked apex, not projecting and not deep-rooting, not opaque, not conspicuous; basidioles fusoid; hymenophoral trama consisting of hyphae running not all in the same direction and intermixed with a few very broad and short ones, some hyphae with moderately thick wall, most thin-walled, all hyalino; epicutis consisting of hymeniformly arranged vesiculose elements which are smooth but often forked into two rounded lobules, or protracted and nodulose and ramose, or with 1—2 appendages or a mucro, some broader than high, some somewhat elongated, hyaline; all hyphae with clamp connections, amyloid. — On very rotten wood, on humus, and on leafmold in subtropical and subtropical-montane forest, gregarious. Brazil, type (K) — Argentina, prov. Tucumán, Vieja Carretera al paso San Javier, April 24, 1951, S i n g e r T 1527, LIL; Rio de los Sosas, February 4, 1955, S i n g e r T 2119, LIL.

2. var. **hymeniicephalus** (Speg.) Sing. comb. nov. *Ag. hymeniicephalus* Speg. An. Soc. Cient. Arg. **16**: 244. 1883).

Pileus hyaline, hygrophanous, dry pure white all over, sulcate or rugose-reticulate on the margin, transparently pustulate-reticulate-sulculate in an intermediate zone, smooth or (later) rugulose on the disc, marginal zone about 3 mm. broad, glabrous, not viscid, convex, soon becoming applanate, often umbilicate, 10—30 mm broad. — Lamellae white or whitish, rather narrow to rather broad (e. gr. 3.5 mm. broad), distant, linear, adnexed to adnate, forked, intervenose and anastomosing (anastomoses reaching up to $^3/_4$ or the full breadth of the lamellae in height). — Stipe white to hyaline at the apex, gradually or rather abruptly (so in T 1084) chestnut brown or ochraceous brown in lower third to two thirds, fresh finely pruinate or fibrillose all over or in the upper third to two thirds, glabrescent, often eccentric, equal, or sometimes slightly attenuate in lower half, soon tubulose, terete or canaliculate, 30—50 × 1.2—2.5 mm.; basal tomentum white, in dried condition often sordid white, often continued in lower third of stipe by a fine pubescence,

often covering the substratum with white arachnoid filaments of thin membraneous films; inodorous or with a slight odor of shrimp. — Spores 5.5—8.2 × 2.7—4.8 μ, ellipsoid, oblong or sometimes subcylindrical, smooth, hyaline, nonamyloid; hymenophoral trama regular with subparallel moderately broad elongate hyphal elements; basidia 22—25.5 × 5.5—7 μ, 4-spored; cystidia none; epicutis of pileus consisting of subglobose pedicellate or clavate-vesiculose hymeniformly arranged cells which are either completely smooth and entire, or else (in some) nodulose or hooked or pronged at the apex where they are perhaps somewhat gelatinized since the spores often adhere to these excrescensies, 17.8—23 × 7—22 μ; hyphae of pileus and hymenophore slightly and incompletely amyloid (in places reaching a reddish gold brown in accumulations), or distinctly and strongly amyloid after a few minutes of exposure to the Melzer, in the stipe always strongly amyloid, all clamped and hyaline. — On woody humus and on leaves and branches fallen to the ground, in subtropical and marginal forest, solitary or gregarious, December until February. Paraguay, type (LPS, K). — Argentina, prov. Tucumán, Quebrada de Lules, Singer T 1245, LIL.; Los Sosas, Singer T 1084, LIL; Vieja carretera al San Javier, Singer T 1200, LIL.

This differs from the type form in hyaline or white pileus and perhaps relatively shorter spores. In T 1084, the stipe was sharply divided into a white and a chestnut brown area, the spores were slightly smaller, the cells of the epicutis often not entire. I have the impression that this character combination merely occurs in early (December) collections without being hereditary inasmuch as forms with entire and less entire epicuticular cells also occur in other varieties, and the coloration of the stipe changes individually as well as according to the age of the carpophores. These differences are indicated here, however, on the off-chance that they may coincide with a seasonal dimorphism.

More serious is the presence, within this variety, of two chemical forms or races, one characterized by hyphae which are so little and so inconsistently amyloid in the pileus that one may easily conclude that the species belongs in the *Alliacei* rather than the *Globulares* unless the tissue of the apex of the stipe is likewise studied. This observation refers not only to T 1245, but to some specimens determined by Spegazzini himself which in turn caused my error of considering *M. hymenocephalus* as nonamyloid while in reality, some carpophores of the type are distinctly amyloid both in pileus and stipe. This point was checked upon on Kew material and the type collection of the Spegazzini Museum, and the amyloidity of both portions must be considered as definitely demonstrable to rather strong (stipe). I have not succeeded in establishing any conditions influencing the degree of amyloidity of the pileus hyphae. Although

there is always a sharp line between inamyloid hyphae of a species and partly weakly amyloid pileus hyphae in another, the degree of amyloidity observed may be dependent on environmental or development factors, or, if hereditary, can hardly be considered as systematically important in this stirps. Nevertheless, it is very important to avoid erroneous interpretations, and, generally in the *Marasmii,* it appears to be recommendable to specify that the Melzer should act on the tissue of the stipe for at least 30 minutes before a negative reaction may be assumed to exist.

3. *Marasmius cohortalis* var. **pseudocollinus** Sing. & Digilio ex Sing., var. nov.[1])

Pileus "Inca gold", "Pablo" in the center, gradually whiter outwards, transparently striate when wet, smooth when dry, glabrous, subhygrophanous, center pl. 11 G 6 (M & P) when dry, margin white when dry, convex, sometimes subumbonate, in age applanate, 8—31 mm. broad. — Lamellae white, eventually often sordid pallid, adnexed to adnate, subclose to subdistant, at first rather narrow but soon moderately broad to very broad, not or slightly intervenose, at times a few forked; spore print pure white. — Stipe white, in age light cinnamon with white apex, finely pruinate to slightly tomentose, equal or tapering downwards, narrowly tubulose, 20—38 × 1.5—2.5 (4) mm.; basal fibrillosity scanty, white. — Context white; odor of *Marasmius oreades* or fruity as in some *Suilli,* or inodorous. — Spores 6.7—7.5 × 3.3—3.5 μ, smooth, hyaline, non-amyloid, ellipsoid to ellipsoid-oblong, rarely slightly sausage-formed or tilda-formed, eventually sometimes bicellular; basidia 4-spored, 29.2 × 5—5.3 μ; cystidia none; cheilocystidia none; epicutis consisting of erect elements, the terminal element being subisodiametric or short-clavate, e. gr. 20—26 × 10—12.3 μ, below often shorter or longer cells rising vertically from the cutis formed by the hypodermium, sometimes with crystals adhering to the apex or with very scattered pigment bodies (epimembranal); hyphae of pileus very slightly to distinctly amyloid; those of stipe strongly amyloid, all with clamp connections. — On deep earth, often among herbs or grasses, open places of the plains, also under scattered trees in the montane zone, among Gramineae, in summer. Argentina, prov. Tucumán, Aguadita, Singer T 1329, LIL, — Anta Muerta, Singer T 1667, LIL, type. — Tucumán, Capital, Singer T 2070, LIL.

This variety differs from the type variety in weaker Melzer reaction, less distinct anastomoses among lamellae, smoother margin, and habitat. It comes rather close to the European *M. collinus.*

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[1]) Varietas notis nonnullis ad *M. collinum* transiens.

4. *Marasmius cohortalis* var. **arenicolor** Sing. var. nov.[2])

Pileus "cracker" to pl. 13 F 7 (M & P), or pl. 12 F 6 to pl. 11 G 5 (M & P) when wet, hygrophanous, white or whitish when dry, the majority of the caps grayish when dried, few white, smooth but soon becoming more or less sulcate when dry, but transparently striate when wet, glabrous, not viscid, convex, soon becoming umbilicate, eventually more applanate and often with uplifted margin, 11—28 mm. broad. — Lamellae varying from hyaline white to pale creamy gray ("Longbeach" M & P), mostly strongly intervenose except for immature caps, subdistant or distant, rather broad to broad (to 4 mm.), somewhat ventricose, adnexed to adnate. — Stipe white, in lower portion becoming "clay", "Spruce y.", or finally "cognac" with gradual transition to the white apex, extremely finely pruinate-fibrillose, glabrescent, hollow, sometimes canaliculate, often spirally twisted when dried, equal or sometimes with slightly enlarged base and apex, 17—38 × 1.8—2.8 mm.; basal mycelium whitish. — Context white, with a slight and pleasant fruity odor (as in some boletes). — Spores 6.7—8.2 × 2.5—5.2 μ, rarely with suprahilar depression, thin-walled or almost so, hyaline, smooth, non-amyloid; basidia 31.5 × 6.8—7.5 μ, 4-spored; cystidia none; epicutis of pileus consisting of a hymeniform layer of clavate-vesiculose to subglobose cells whose upper portion is very rarely and rather indistinctly nodulose, hyaline, inamyloid, 23—29 × 10—14 μ; dermatocystidia of stipe hyaline, erect or appressed to the surface of the parallel hyphae of the trama, thin walled, polymorphous but often cylindric, inamyloid, 9—41 × 3.5—4.8 μ; hyphae distinctly amyloid, especially in the stipe. — On woody humus under leguminous trees in parks and in subxerophytic to xerophytic (Chaco-vegetation) woods. Argentina, prov. Tucumán, Parque Avellaneda, Singer T 1445, LIL, type. — La Higuera, Singer T 2103, LIL. — San Pedro de Colalao, Singer T 2059, LIL.

This differs from the type variety in more buffish-grayish color of the pileus.

5. *Marasmius albogriseus* (Peck) Sing.

Pileus whitish, tending to gray or fuscous, glabrous, smooth but in age and on drying becoming sulcate on the margin which is often somewhat irregular, opimous but not viscid, convex, the subapplanate, 23—30 mm. — Lamellae whitish to grayish white, moderately distant or subdistant, very broad, very narrowly rounded-adnexed to broadly adnexed, not intervenose or with occasional interlamellar anastomoses. — Stipe whitish to grayish pallid or pale sordid gray, without a chestnut colored lower portion, subequal, hollow, finely pruinate above, glabrescent, finely tomentose below and tomentum transient into the basal mycelium, 20—40 × 2—3.5 mm.; basal tomentum well

[2]) Varietas pileo arenicolori secedens.

developed, sordid-white or grayish to cream. — Context whitish and inodorous. — Spores 5.5—7(8.8) × 3.5—4(4.5) μ, ellipsoid, inamyloid, smooth, hyaline; basidia 29 × 6.2 μ, (2-)4-spored; cystidia none; cheilocystidia very inconspicuous and easily overlooked, filamentous, clavate, or clavate-forked, sometimes septate, 15—32 × 4—8.3 μ; epicutis cellular; hyphae amyloid, hyaline, forming a regular hymenophoral trama, clamp connections present. — Under trees and outside the wooded areas, in South America above the tree line, subcespitose, on soil. California, type of *Collybia fimicola* Earle, NY (see also Lloydia **5**: 125. 1942). — Bolivia, Cochabamba, Colomi, 3400 m. alt., M. Cárdenas 243, LIL. — Argentina, prov. Tucumán, Laguna Seca, Cumbres Calchaquies, 4150 m. alt., B. Sparre 9587, LIL. — Prov. Catamarca, between Minas Capillitas and Cerro Negro, B. Sparre, comm. Singer T 1915, LIL.

The type of *Collybia albogrisea* was studied by A. H. Smith, and the analysis published by him coincides well with the descriptive data given above. *Collybia fimicola* and the Bolivian collection have spores somewhat larger (longer) than the majority of the collections which seems to be caused by the presence of 2-spored basidia. Both collections seem to have grown on richer soil than ordinary, the Californian type on dung.

This species differs from the other species and varieties of this stirps in having broader and less intervenose to non-intervenose lamellae which are also slightly less distant, agreeing thus with *M. cohortalis* Berk. var. *pseudocollinus* Sing. (also growing in open places rather than in the forest) but differs in color which tends to gray rather than to yellow, in being less thermophilous and growing subcespitosely. In color it comes closest to *Marasmius cohortalis* var. *arenicolor* Sing. which differs strongly in habitat, characters of the lamellae, and spores.

Not all similar forms belonging to this stirps and collected in North America, are identical with *M. albogriseus*. The following description is that of a collection from Florida, a topotype of *M. alachuanus* and compared with the latter (the type was described in fresh but dry condition):

Pileus grayish white when fresh, or cream-gray-pallid, hygrophanous and white or whitish when dry, glabrous, sulcate on margin when quite mature, transparently reticulate in intermediate zone when thin, at least in moist weather, sometimes becoming scrobiculate on drying, not viscid, convex, then applanate, and often irregular, with umbilicate disc, 8—33 mm. broad. — Lamellae sordid and very pale yellowish gray, pallescent, 1—4, mostly about 2.5 mm. broad, i. e. moderately broad to rather broad, strongly intervenose, distant, sometimes subdistant or very distant, horizontal, not ventricose, adnexed. — Stipe pallid to white at apex, ochraceous fulvous, or

sometimes tawny, even reaching Mars brown at base, and progressively more colored with age, minutely pruinose and glabrescent, smooth, or sometimes canaliculate-doubled, subequal or tapering downwards, tubulose, 30—47 × 1.5—3(4) mm., basal mycelium pallid to whitish and continued white on the substratum in many cases,

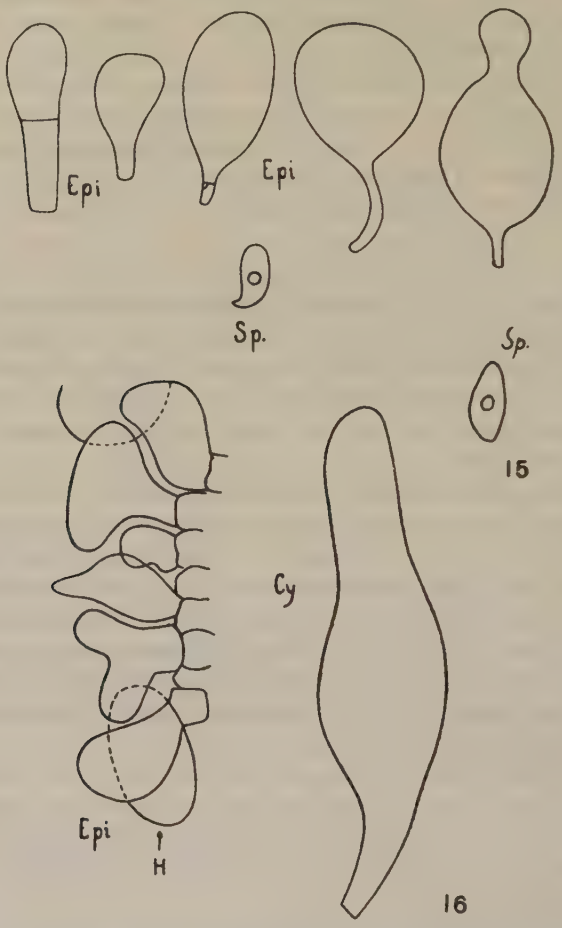


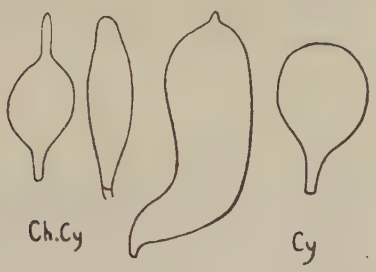
Fig. 15. *M. riparius.* Spore, × 1000.
Fig. 16. *M. silvicola.* Epi, elements of the epicutis of the pileus, Epi H, fragment of the hymeniform layer of the pileus, × 500. Sp., spore, × 1000.

forming floccons and thin membranous sheets. — Context very thin, concolorous with surfaces, tough and reviving, with or without a slight odor of crabs. — Spores (5.2)6—7(8.2) × (2.3)2.8—3.6 μ; basidia relatively long, 4-spored; cystidia none; epicutis cellular, cells about 20 × 14 μ or shorter, hymeniformly arranged; hyphae strongly amyloid, with clamp connections. — On leafmold and forest litter in

hammocks, often in rows or circles, summer. Florida, Gainesville, type (FLAS); July 2, 1943, Singer F 2511, (F).

This is obviously not *M. albogriseus* because of the characters of the lamellae, the habitat and the spores. It agrees much rather with *M. cohortalis* var. *arenicolor* of which I believe it to be a form differing only in some minute characters which are possibly inconstant.

Marasmius riparius Sing. in Sing. & Digilio (Fig. 15).



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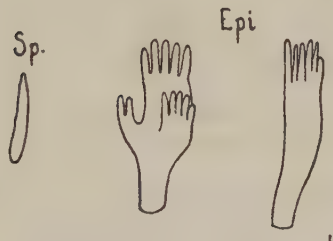

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Fig. 17. *M. lilacinus*. Ch.Cy, cheilocystidia. Cy, pleurocystidia, ×1000.

Fig. 18. *M. inaequalis*. Sp, spore. Epi, broom cells of the epicutis of the pileus, both ×1000.

Nothing can be added to the original diagnosis of this species.

Marasmius silvicola Sing. in Sing. & Digilio (Fig. 16).

Nothing can be added to the original diagnosis of this species. See, however, also under *M. tortipes*.

M. tortipes Berk. & Curt.

The type from Cuba (K) has many half-collapsed epicuticular cells left, and one may conclude that the species belongs here inasmuch as the trama is slowly amyloid; cystidia, if there are any — I could not make it out with certainty — are yellowish-hyaline in the Melzer (color of basidia); spores not recovered. The carpophore has adnexed distant lamellae, long, glabrous stipe with sordid-whitish basal tomentum.

The state of this specimen is such that I do not think it wise to rename our *M. silvicola* in favor of this "classical" binomial. If, among the *Globulares* of similar habit, only *M. silvicola* were found at the original locality, and a topotype-lectotype were designated, *M. silvicola* would have to be considered as a synonym of *M. tortipes,* not, however, on the basis of the type analysis.

Collybia lilacina Coker (Fig. 18).

The type from North Carolina (FLAS) is identical with specimens found further south, and is therefore included in the present paper. Spores 6.5—7.5 × 4 μ; basidia 27 × 6.5—7.5 μ, 4-spored; cystidia

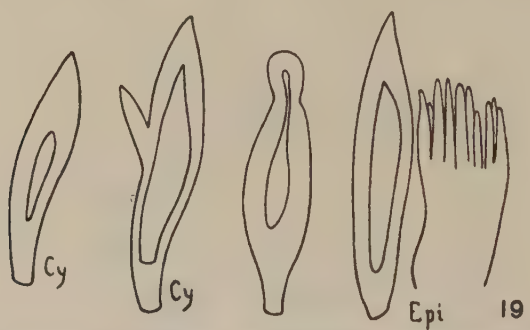

Fig. 19. *M. flammans.* Cy, three setuloid pleurocystidia. Epi, setuloid element of the epicutis and broom cell, both × 1000.

crowded on and near the edge, scattered on the sides of the lamellae, often with gray sap and becoming olive gray in iodine, globose-pedicellate, ventricose, broadly ampullaceous with thin mucro, etc., 33—67 × 11—24 μ; hymeniform epicutis consisting of cells which are 7—27 μ in diameter, smooth, some with rather thick walls, most thin-walled; hymenophoral trama regular, its hyphae 5—17 μ in diameter, these as well as the tissue of the pileus trama and the hyphae of the stipe, and even the basal strigosity distinctly amyloid and hyaline in NH_4OH. I have never seen specimens with lilac colored pileus, but it is possible that further north (North Carolina) such a tinge is more evident.

Extralimital species.

Collybia arborescens Henn.

The type from the Cameroons has, probably been destroyed. However, the species is characteristic enough to permit the acceptance of authentic material (P), collected by Zenker, no. 1362, 1899, at Bipinde, Cameroons. This has strongly amyloid trama and epicuticular obpiriform subvesiculose elements which are e. gr. 37 × 16.5 μ, arranged in hymeniform structure. The secondary septation of the

spores, as observed by Heim (who correctly transferred this species to *Marasmius*), seems to be not uncommon in this section; it has been observed in other species also (see above). The densely fasciculate manner of growth does not justify, in my opinion, a special section for this species, inasmuch as the habit cannot be compared with the truly ramose habit of some species of the section *Rotulae*. Consequently, I consider *M. arborescens* (Henn.) Heim as a species of the section *Globulares*, and the section *Sympodia* Heim as a synonym of the latter.

Other extralimital species of section *Globulares* have been indicated in Lilloa **22**: 326. 1949 (1951), and were keyed out l. c. 329—331.

Section *Sicci* Sing.

Marasmius inaequalis Berk. & Curt. (Fig. 19).

The type from Cuba (K, FH) is extremely remarkable since it is the only species known thus far which has all the characters of section *Sicci* with the exception of the amyloid tramal hyphae in the pileus. These hyphae, in the type of *M. inaequalis*, are definitely inamyloid although, otherwise, it does not show any affinity with the section *Hygrometrici* since there is a white basal mycelium (stipe not insititious) in addition to mycelial patches around the base. Spores hyaline, inamyloid, 11—12.5 × 2—3.2 μ; basidia 20 × 5.5 μ; cheilocystidia are broom cells of the same kind as observed in the epicutis of the pileus; pleurocystidia were not observed. The epicutis of the pileus is hymeniform, consisting of broom cells which are entirely hyaline in KOH and inamyloid, the apical erect setulae rather thin and 3.5—4.5 μ long, the entire cell cylindrical to hand- or *Clavariella*-shaped, 13—20 × 5.5—6.5 μ; hyphae all hyaline, with clamp connections.

For this species, so aberrant among the others, we propose the subsection

Inaequales subsect. nov.

Characteribus sectionis *Siccorum*, sed hyphis pilei inamyloideis. Typus: *M. inaequalis* Berk. & Curt.

This subsection is opposed to the subsection *Siccini* Sing. (Hyphis amyloideis; typus *M. siccus* (Schwein.) Fr.).

Siccini Sing.

Agaricus cohaerens A. & S. ex Fr., *M. flammans* Berk., *M. jalapensis* Murr., *M. echinatulus* Sing. (Stirps *Cohaerens*).

The type of *Agaricus cohaerens* is not preserved, but the species cannot be confussed. The type of *Agaricus spinuliferus* Peck is identical, and so is the type of *M. setulosus* Murr., both from North

America, and analyzed by this author in previous type studies. It seems that the Florida form is aberrant in having medium distant lamellae and setae with hyaline base. It approaches, thus, what Murrill had described as *M. jalapensis* Murr. from Mexico which is, however, more different from typical *M. cohaerens* than the Florida form, and the latter is consequently treated as conspecific with *M. cohaerens.*

The type of *M. echinatus* Theissen ex Sing. (non Romell), Lilloa **25**: 212. 1951 = **M. echinatulus** Sing. n. n. from Southern Brazil (FH) agrees closely with several collections I made in Argentina; these were described previously (Lilloa **25**: 210. 1951). This species differs from *M. jalapensis* Murr. in lacking setae on the sides of the lamellae.

Closer to *M. cohaerens* because of denser lamellae, the type of *M. flammans* Berk. (K) differs in the characters of the setae. It comes from São Jeronimo, Amazonas, Brazil, and is sterile or immature (no spores found). But the setae of the upper surface of the pileus and in the hymenium are very characteristic and permit to recognize the species. Setae of pileus among broom cells with apical erect colored setulae, more or less pseudoamyloid, fusoid, acute, with very thick walls; on sides of lamellae deep rooting, projecting moderately, mostly sharply acute, very few with rounded tips, with thick (3—3.7 μ) weakly pseudoamyloid wall, sometimes with a lateral spine (reminiscent of the metuloids of *Pluteus magnus*), fusoid, the blunt-tipped ones also ampullaceous or clavate, 30—48(55) × 9—9.8(11) μ, numerous; surface of stipe entirely glabrous and without setae; hyphae amyloid. On dead leaves. (Fig. 19).

It is questionable whether, in a strict sense of the term, the cystidia of *M. flammans* may be called setae. The brown thickwalled acute bodies of *M. cohaerens* correspond at least to the definition of the term while the cystidia of *M. flammans,* although evidently homologous with those of *M. cohaerens,* do not. They should probably be designated as setoid cystidia, or metuloids.

Marasmius coprophilus Speg.

The type was analyzed previously (Lilloa **25**: 485. 1952), and nothing can be added to the data then obtained. Singer & Digilio observed and described a very similar fungus on the same substratum (dung) which differs by acystidiate lamellae, sec l. c. p. 209.

For further comments, see under *M. anomalus* Lasch.

Marasmius tucumanus Sing. in Sing. & Digilio (Fig. 20).

Nothing can be added to the original description, Lilloa **25**: 206. 1951.

Marasmius tageticolor Berk.

The type from "Panuré" (Ipanuré = Sao Jeronimo, Amazonas), Brazil, Spruce 37 (K, FH) has spores narrow and about 17.5 μ long;

basidia 16.5 × 7 μ; cystidia on the sides of lamellae absent; trama amyloid; epicutis much as in *M. haematocephalus* (Mont.) Fr. (see there).

Both portions of the type are definitely acystidiate. Consequently, *M. tageticolor* is not closely related to *M. haematocephalus* var. *pseudotageticolor* Sing. (*M. tageticolor,* Sing. & Digilio) or var.

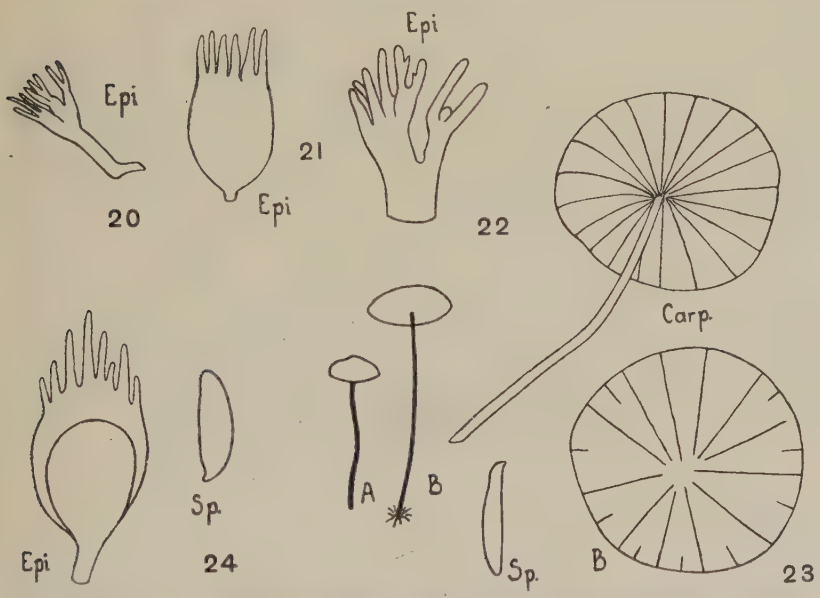

Fig. 20. *M. tucumanus.* Epi, broom cell of the epicutis, × 1000.
Fig. 21. *M. bellus.* Epi, broom cell of the epicutis, × 1000.
Fig. 22. *M. longisporus.* Epi, broom cell of the epicutis, × 1000.
Fig. 23. *M. rhabarberinus.* Carpophores and spore. A, specimens of the Spruce type, B, specimens of the Trail (Rio Puruá) collection, both natural size. Sp, spores, × 1000.
Fig. 24. *M. berteroi.* Epi, broom cell of the epicutis. Sp, spore, both × 1000.

haematocephalus (*M. tageticolor,* Dennis).

Marasmius bellus Berk. (Fig. 21).

The type (K) comes from the same locality as the preceding species, and grew on débris. Spores were not observed. Cystidia on sides of lamellae none; broom cells of the epicutis hymeniformly arranged, hyaline and amyloid in the lower portion, hyaline and inamyloid in the upper portion, including the setulae which are about 9 μ long, erect and apical; hyphae amyloid. Lamellae narrow, distant, rather distinctly anastomosing, forked, adnexed. Stipe smooth and glabrous, rather deep chestnut below with enlarged base, basal

tomentum consisting of a majority of white strigose fibrils, with a few scattered subfulvous fibrils mixed in.

These data were taken from the larger carpophore (unnumbered) of the type collection. The smaller specimen has apparently less anastomosing and somewhat broader lamellae, and paler stipe, but is hardly specifically different. I am convinced that this had white pileus since the broom cells of the pileus are entirely colorless, a feature not observed in any colored species of this group.

Marasmius subrotula Murr.

I have not studied the type which was, however, compared with a Trinidad collection by Dennis. The latter (K), in turn, was reexamined by me. Its spores were found to be 10.3 × 3 μ and inamyloid; broom cells of the pileus hyaline, with apical setulae; cystidia on the sides of the lamellae none; hyphae amyloid.

This is evidently close to *M. bellus,* but much smaller. There is a white mycelial pad at the base of the stipe.

Dennis' s drawing (Trans. Brit. Myc. Soc. 34: 422, fig. 1, 1951) suggests that Murrill's type from Jamaica (NY) has broom cells of the *Rotalis*-type. This would, in turn, mean that it belongs in the section *Hygrometrici* Kühner, if it is permitted to assume that the type lacks a basal mycelium and has inamyloid trama.

Marasmius digilioi Sing. in Sing. & Digilio.

A complete description was given in Lilloa **25**: 201. 1951.

Marasmius trinitatis Dennis.

The type from Trinidad (K) has spores 9.8 × 3—3.3 μ, hyaline, smooth, inamyloid; cystidia on sides of lamellae none; cheilocystidia are brown cells like those of the epicutis; the latter have apical erect setulae. The trama is amyloid. The basal mycelium of the stipe is white.

Androsaceus longisporus Pat. (Fig. 22).

The type from Venezuela (FH) was collected at Puerto Zamuro by Gaillard, May 25, 1887. The spores are so collapsed and scarce in the type sectioned that they cannot be measured satisfactorily. Patouillard indicated them in fresher material as 20 μ long; cystidia none on the sides of the lamellae; epicuticular broom cells arranged hymeniformly, hand-shaped or *Clavariella*-shaped, fuscous-melleous, 15—17.5 × (spreading to) 10—15 μ, the setulae acute to obtuse, 5—7 μ long. The carpophores are rather small, about the size of small to medium sized *M. haematocephalus* or *helvolus;* pileus new ochraceous tawny to deep rusty, sulcate; stipe yellowish umber, shining and glabrous. There is a conspicuous sordid whitish radially strigose basal mycelium. The carpophores were collected on wood.

This species differs from *M. helvolus* only in the absence of cystidia, and possibly different color of the pileus. Since Dennis

finds his collection of *M. helvolus* to be acystidiate, it is logical to assume that what he had was *M. longisporus* (Pat.) Sacc.

M. phaeus Berk. & Curt. may well be this species (see below). Some Argentine material is foliicolous with spores 13—14 μ long; this needs further comparative studies regarding the separation of *M. longisporus* and *Marasmius phaeus* Berk. & Curt.

The type from Cuba (K) did not yield any spores; cystidia none; cheilocystidia much like the broom cells of the epicutis; epicutis hymeniform, consisting of clavate broom cells with acute 5—8.8 μ long, brownish apical setulae; trama amyloid. The habit is much like that of *M. helvolus,* with now dark porphyry brown pileus with sulcate margin, up to 10 mm. broad, with distant equal lamellae which are narrowly adnexed; stipe deep brown, with sordid whitish basal mycelium, the edges of the lamellae discolorous. This is Wright no. 18, on wood.

Not knowing the spore size and the original color of the pileus, one hesitates to place this species with confidence. It may very well be the same as *M. longisporus,* but the latter is a well defined species which should not be renamed because of the priority of the epithet *phaeus,* at least as long as spore-bearing material of *M. phaeus* has not been collected at the type locality.

Marasmius rhabarberinus Berk. (Fig. 23).

The type from "Panuré" (Ipanuré), i. e. São Jeronimo, Rio Negro, est. Amazonas, Brazil, was collected by Spruce, no. 140, (K, FH). At Kew, there is also a specimen collected by Trail (161) from Rio Puruá (Purús) Amazonas, Brazil. The Farlow material does not contain spores but the Kew type contains spores. These are 14—19 × 2.3—3.8 μ; cystidia none; epicutis with broom cells; hyphae amyloid. The pileus is bright orange fulvous to fulvous, now 7—27 mm. broad; lamellae distant, not connected by veins, free; stipe glabrous, with white mycelial strigosity, with the tips of the fibrils becoming fulvidous. The Trail specimen differs from the holotype (K) in having even more distant lamellae. Otherwise it resembles the largest specimen of the Spruce type, and is probably identical with it.

On the basis of "authentic material", this species was considered a synonym of *Heimiomyces tenuipes* in an earlier paper, but this authentic material, deposited both at FH and PC is, as the analysis of the holotype shows, a misdetermination, and quite different from the original type. Dennis has pointed this out, but in the same paper synonymized *M. rhabarberinus* with his *M. leoninus.* The much larger spores and the characters of the lamellae show that *M. rhabarberinus* is not identical with *M. leoninus* Berk. (type), and the absence of cystidia as well as the more distant lamellae prove that it is different from *M. dennisii* Sing. (*M. leoninus* sensu Dennis).

Heliomyces berteroi Lév. (Fig. 24).

I have not studied the type, but the understanding of this species is based on data published by A. H. Smith. Material deposited at MICH coll. E. B. Mains 3660, July 28, 1936 from British Honduras was compared with material collected and described by Singer & Digilio (Lilloa **25**: 202. 1951), LIL. Since these collections coincide

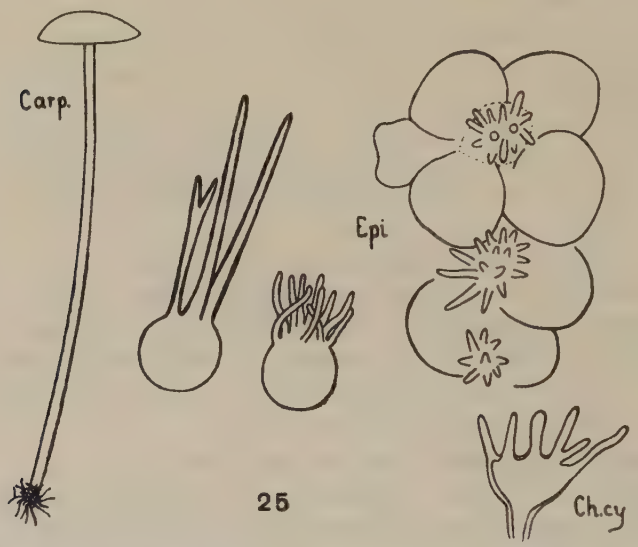

Fig. 25. *M. corrugatus*. Carp., carpophore in natural size. Epi, broom cells and frontal view (scalp) of a fragment of the epicutis of the pileus, Ch.cy, cheilocystidial broom cells, all × 1000.

tolerably with the original account, we include the species in this sense in the key. A colored photo of what I believe to be this has appeared in "Life", Oct. 18, 1955, p. 56, lower right corner.

Androsaceus corrugatus Pat.; *Marasmius cladophyllus* Berk.; *M. leoninus* Berk. (Stirps *Leoninus*).

The type of *A. corrugatus* (Fig. 25) from Guadeloupe (FH) is well preserved. It is a characteristic species of the "stirps" *M. corrugatus-cladophyllus-leoninus* all of which have medium sized spores, close lamellae which are adnexed to adnate, and lack cystidia. Since this species is rather frequent, and has a wide area of distribution, yet remains little known, a redescription is given below:

Pileus ochraceous-castaneous to rich chestnut, often with orange tinge ("burnt sienna" R., "Saratoga" M & P), center often with a hue of tan color or more reddish orange, with faintly to slightly striate margin, otherwise finely rugose, radiate-venose with anastomosing veins, often strongly corrugated on disc, campanulate to convex-

applanate, 8—22 mm. broad. — Lamellae whitish to cream color, on drying tending to become subconcolorous with the pileus, close to crowded, horizontally adnate to adnexed or subfree, narrow to moderately broad and often with pale fulvidulous edge, not anastomosing. — Stipe white above, below white only in the primordial stage, early chestnut and eventually chestnut-black, when young and fresh smooth and glabrous but very finely pruinate under binocular, glabrescent in age, 38—65 × 1.5—2 mm. with concolorous or at least pale fulvous basal tomentum or strigose fibrillosity. — Context white, inodorous. — Spores 7.5—11 × 3—4.5 μ; cheilocystidia as the broom cells of epicutis but always pale melleous; cystidia none; epicutis of pileus hymeniform, consisting of broom cells, the latter light melleous and in clusters also deeper colored (fulvous to chestnut-fulvous, or brownish orange), in some collections almost all light melleous, in others almost all deep colored, 14.3—35 × 7.3—9.5 μ, setulae 5.5—8.7 × up to 3.5 μ, but usually thin and long, obtuse or acute, main body often hyaline, at least below; hyphae all amyloid with clamp connections, often very broad, in basal strigosity often thick-walled; pruinosity of stipe consisting of scattered broom cells. — On dead vegetable matter: dead leaves of Gramineae, Pteridophyta, Solanaceae, *Schinus, Quercus,* also on small branchlets, on dead wood (various conifers, Dicotyledones), etc. Florida, Singer F 597, F — Guadeloupe, Duss 1769 (FH), type. — Brazil. est. Santa Catarina, Rick 576 FH. — Argentina, prov. Catamarca, Singer T 1822 (LIL).

There is a slight variability in the characters of the epicutis and the cheilocystidia. The latter were found to be subhyaline in the South American material; the epicuticular elements are also slightly paler in an average in Brazil and intermixed with smooth elements while the Argentine material has many smooth elements on the gill edge, and only some of the elements have appendages. I do not believe that these variations have much taxonomic importance.

Another species of this group is characterized by strongly intervenose lamellae. Three type specimens refer to this:

(1) *Favolaschia magnifica* Henn. The original type has been lost, but authentic material was studied previously (see Singer, Lloydia **8**: 218. 1945). It is identical with the following.

(2) *Marasmius polyporoides* Murr. which was reexamined by both A. H. Smith (Contr. Mich. Herb. **1**: 22. 1939) and Dennis.

(3) *Marasmius cladophyllus* Berk. The type seems to be too close to the other two specimens to be separated specifically.

Consequently, we adopt the latter name as the oldest available and combine our own data on fresh material with the data obtained from the type studies in the following description:

Pileus between "zink orange" and "tawny" or between "xanthine orange" and "umber brown", (R), or fulvous with lighter colored margin, or deep rusty fulvous with orange fulvous margin, slightly venose to slightly rugose (rarely strongly so), at first smooth on margin, later with sulcate margin especially when dried, but also sometimes entirely smooth all over, glabrous, convex and often with umbilicate center, later applanate to concave and often with uplifted margin, 12—50 mm. broad. — Lamellae pallid with the edges concolorous but paler than the pileus, strongly forking and merilioid-anastomosing, more rarely less frequently forked and merely more or less densely intervenose intermixed, subclose to subdistant, horizontal-linear, adnexed to adnate, spore print pure white. — Stipe white or whitish at apex, at least at first, pale brownish below, and eventually reaching dark chestnut in the lower portion, finely pubescent at the apex, less pubescent to subglabrous below, glabrescent with age, not shining, equal, 35—95 × 1—2 mm., with fulvous basal strigosity from which hyaline mycelial fibrils arise, but general color impression of mycelial tomentum pale fulvous to fulvous, — Context white, inodorous or smelling of sauerkraut. — Spores 7.7—10.5 × 2.3—4.8 μ; Cheilocystidia as brown cells of epicutis, but some with hyaline setulae; cystidia none; epicutis of pileus consisting of hymeniformly arranged broom cells which are hyaline below, with hyaline, pale orange, or rusty yellow to ferruginous setulae, the latter (3.5)5—12(24) × 1.5—1.8(3.5) μ, the entire cell 15—25 (32) long and spreading above although the setulae are mostly vertical and all apical; appearance of epicutis in scalp view mottled since darker and paler setulae alternate; hyphae of hymenophore and context of pileus hyalinem strongly amyloid, of two types, one with very thin, one with slightly to considerable thickened walls, with clamp connections. — On fallen leaves, palm leaves and rotten pieces of wood, most frequently on foliage of tropical forest trees and in low hammock vegetation, northern subtropics and tropics. Florida, Highlands Hammock State Park, Highlands Co. F 406, F 521 (F). — Panamá Canal Zone, Barro Colorado Island and Corundu and Rio Sardinilla, G. W. Martin & coll. no. 7552, 7673, 8360, (IOWA, F). — Brit. Honduras, E. B. Mains 3628, Valentin, El Cayo Distr. June 24, 1936, det. A. H. Smith (as *M. polyporoides*), MICH. — Brazil, Amazonas, Juruá, Bom Fim, E. Ule 2699, on *Heliconia* sp., November 1900, FH. — Est. Rio de Janeiro, Angra dos Reis, Singer B 436, F. — Rio Grande do Sul, Serro Azul, Rick 422, FH.

The third species of this stirps is *Marasmius leoninus* Berk., from "Panuré (São Jeronimo, Amazonas, Brazil), coll. Spruce (FH, K). Spores 8.7—9.8 × 2.3—3.3 μ; cystidia none; cheilocystidia like broom cells of epicutis; epicutis hymeniform, consisting of broom cells with apical golden melleous setulae; hyphae strongly amyloid. The pileus

is 27 mm. broad, sulcate, fulvous orange. The stipe is 70 × 1.3 mm., glabrous, on one side with now pale orange tan colored basal tomentum. Lamellae moderately distant, subdistant, not intervenose or not distinctly so, adnate to broadly adnexed (not free).

As charcaterized above, this has not been re-collected. There are, however, specimens collected by Rick (FH) which have a slightly more olive tinge on the pileus, and there is also a collection of mine from Florida which has a much more olive pileus. These will be described below as *M. leoninus* var. **olivascenticeps** Sing. var. nov.

Pileus orange with an olive tinge or fuliginous olive in the center and pinkish brown on the margin, smooth in the center, with sulcate margin, up to 20 mm. broad. — Lamellae whitish with olive colored edges, moderately broad, moderately distant or subdistant, free to adnexed. — Stipe chestnut, reaching chestnut black below when old, much paler toward apex, the apex itself usually white in fresh material, everywhere smooth, slightly white pruinose above the base, the apex thinly pruinulose under binocular, otherwise glabrous, 40—50 × 1.5—2.5 mm., basal mycelium tomentose or strigose, brown or fulvous. — Context white, rather thin except in the center of the pileus. — Spores 8.5—11 × 3.5—4.5 μ; cystidia none; cheilocystidia like the broom cells of the epicutis, also some way off the edge, 20—22 × 5.7—6.5 μ or spreading above, hyaline and nonamyloid, the setulae brownish melleous, somewhat coarse or long-conical 3.5—5.7 × 1.5 μ; epicutis hymeniform, consisting of broom cells like those of the gill edge, 25—28 × 5—7.8 μ with setulae 4.3—7.8 × 1—1.8 μ, melleous hyaline, or, on other broom cells golden melleous to brownish melleous, and scalp view of cuticle therefore appearing mottled; hyphae of pileus hyaline, hyaline, strongly amyloid, with clamp connections, mostly thin-walled, but some slightly thick-walled ones intermixed, in hymenophoral trama all thin-walled. — Both on foliage and rotten wood. Florida, Highlands Hammock State Park, Highlands Co., Singer, F 596 (F), type of variety. — Brazil, Rio Grande do Sul 1933, Rick, FH.

Collybia aurantiaca Murr. (Fig. 26).

The type from Florida (FLAS, FH) has broom cells which are hyaline but beset with upright apical honey yellow setulae of 4—12 μ length, entire cells 17—30 × 6.7—9 μ; hyphae amyloid; cheilocystidia also of the broom cell type; cystidia none.

Material collected by me in Highlands Hammock State Park, Highlands Co., Fla. was relatively pale colored: Pileus between "light pinkish cinnamon" and "pinkish cinnamon", (R), applanate and umbonate, later convex with uplifted margin and depressed disc, strongly radially rugose-venose but not truly sulcate, 9—22 mm. broad. — Lamellae white, subdistant, adnexed, up to 3 mm. broad (narrow).

— Stipe white in upper half, "Kaiser brown" (R) in lower half, often canaliculate, 27—44 × 1.5—2.5 mm., glabrous but mycelioid. On woody branch fallen to the ground, among forest litter, low hammock. Microscopical characters as above. Spores (6.3)6.8—7.5 × 3.5—3.7 μ.

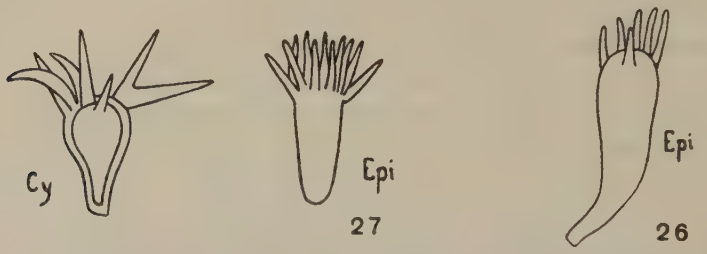

Fig. 26. *M. aurantiacus.* Epi, broom cell of the epicutis, × 1000.
Fig. 27. *M. setulosifolius.* Cy, pleurocystidial broom cell. Epi, epicuticular broom cell, both × 1000.

Marasmius orinocensis Pat.

The type from Atures, Orinoco Region, Venezuela (FH) was collected by Gaillard and has spores measuring 9.8 × 3.5 μ; cystidia none; epicutis of pileus hymeniform, consisting of broom cells which are hyaline in the lower portion, with erect, apical, deep golden yellow, subobtuse to more frequently obtuse setulae, *Clavariella*-shaped, or cylindrical, nonamyloid, 24 × 5—6 μ, setulae 6.5—7 × 1—1.2 μ; hyphae amyloid, some thick-walled, some thin-walled, some very voluminous. The carpophores are relatively fleshy and tough, with white context and fulvous orange pileus surface, smooth. Lamellae subclose. Stipe macroscopically smooth and glabrous, under binocular somewhat subpruinose, basal tomentum well developed, whitish. On dead branches.

I have collected some specimens of this in Florida. One had the thick-walled hyphae of the trama of the pileus, as indicated above, but the other had exclusively thin-walled hyphae. Consequently I give their descriptions separately:

M. orinocensis (typicus, cheilocystidiatus): Pileus fulvous, almost subhygrophanous in zones pallescent, with striate and sulcate margin, otherwise smooth and glabrous, convex, then concave, 18 mm. in diameter. — Lamellae sordid pale cinnamon brownish, medium broad to rather broad, little or not ventricose, moderately close to subclose, emarginate-free to adnate, mostly adnexed. — Stipe fulvous brown to chestnut but with whitish apex when young, glabrous, shining, 30—60 × 2 mm.; basal tomentum strigose whitish or with a few fulvous hyphae mixed in. — Context white, rather thick in the center of the pileus, inodorous, tough. — Spores 7—10 × 2—4 μ;

cystidia none; cheilocystidia are broom cells similar to those of the epicutis; epicutis of the pileus consisting of hymeniformly arranged broom cells, those *Clavarieila*-shaped or cylindrical to subcalavate. 16—24 × 6.5 μ but spreading to 17.5 μ wide, with obtuse to subacute relatively coarse melleous to melleous-brown setulae (these 4.3—7.5 μ lang and 1.2—1.3 μ broad even in their upper portion), some broom cells distinctly thick-walled and more pigmented, some with thin-walled and hyaline main body; hyphae of two kinds, some thick-walled another type thin or rather thin walled, some strongly amyloid, some slowly and weakly amyloid, all with clamp connections. — On small pieces of wood and on sawdust in tropical hammock, Florida, Dade Co., Miami, Simpson Park, S i n g e r F 693 (FH).

M. aff. *orinocensis* (homogeneus cheilocystidiatus). Under this name, material from Florida is keyed out above since it is very close to *M. orinocensis,* type, but differs enough to make it necessary to describe it separately:

Pileus cinnamon to cinnamon fulvous, with sulcate margin, rugose when dry, medium sized. — Lamellae whitish, adnexed or adnate, broad, subclose to subdistant, with inserted lamellulae, not intervenose. — Stipe with white apex, otherwise fulvous to dark fulvous, glabrous, 1.8 mm. thick, with copious white (in dried condition some scattered pale fulvous fibrils also visible) basal strigosity. — Context rather thick in the center of the pileus, inodorous. — Spores 7—12 × 2.8—4 μ, mostly about 8.7—10.8 × 3.5 μ; basidia 17.3—25 × 4.3—5 μ, 4-spored; cystidia none; cheilocystidia 21.5—25 × 5—5.8 μ, spreading above and broader, much like the broom cells of the epicutis; epicutis of pileus consisting of hymeniformly arranged broom cells, the latter 7—8.5 μ broad, with apical conico-obtuse or acute setulae of 5—8.5 × 0.8—1.3 μ, some deeper colored and then in an average with longer setulae; hyphae of the context of the pileus all uniform, all thinwalled and strongly amyloid, all thin to medium broad (up to 8 μ thick, i. e. thinner than the broader ones in the type form), with clamp connections. — On fallen palm leaves, Highlands Hammock State Park, Highlands Co., Florida, S i n g e r F 570 (F).

While there is a trace of gelatinosity in the type and the type form from Florida, the last described form is non-gelatinous. *Marasmius floridanus* Murr. ist undoubtedly one of these forms, and not, as assumed previously, a synonym of *M. spegazzinii* inasmuch as it has larger size than *M. spegazzinii* and also because a species corresponding to the latter was never found in Florida.

One further collection is remarkable for the fact that it lacks cheilocystidia of the broom cell type.

Pileus fulvous-rust-color (dry), with sulculate margin which is smooth in youth but becomes plicate in age, at first often somewhat rugose in the central portion, later smoothened, glabrous, convex,

20—23 mm. broad. — Lamellae subconcolorous, paler, unicolorous, varying from subclose to subdistant, adnexed, not or very slightly intervenose, narrow. — Stipe chestnut color to deep chestnut, glabrous, with a dull shine, 40—50 × 1.3—1.8 mm., with strongly developed white basal mycelium. — Context of pileus white. — Spores 8—10.5 × 2.7—3.8 μ, smooth, hyaline, inamyloid, fusoid in frontal view; basidia 4-spored; cystidia none; marginal broom cells absent; epicutis of pileus hymeniform, consistinig of broom cells which are either entirely golden melleous or hyaline with golden melleous erect apical setulae, with a few (extremely scattered) larger and deeper colored ones occasionally mixed in (these with long setae) ordinarily about 24 × 8 μ, setulae spreading more above, and 6.5—7 μ long (exceptionally reaching 23 μ long); hyphae of the pileus colorless to stramineous in dried material, some thin and thin-walled, many thick and thick-walled, amyloid. — On small pieces of dicot wood, among forest litter. Saladas, Corrientes, Argentina, April 29, 1950, P. Goretta, no. 92, comm. & det. Singer, LIL.

I do not know whether this form or the Florida collections come closer to the type collection which has not been carefully scrutinized for cheilocystidia.

It is possible that both the structure of the trama and the presence or absence of cheilocystidia of the broom cell type are characters of secondary importance, and might be neglected. Nevertheless, this is not proved yet, and separate descriptions appear to be the wiser course.

Marasmius portoricensis Murr.; *Marasmius nummularius* var. *rubroflavus* Theissen; *Marasmius actinopus* Mont.; *Marasmius bahamensis* Murr.; *Agaricus atrorubens* Berk. (Stirps *Atrorubens*).

The oldest epithet entering this group is *atrorubens*. The holotype of *Agricus atrorubens* as preserved in the Hooker Herbarium (K) has hymeniform epicutis with broom cells e gr. 16.3 × 10 μ, setulae fine, 6—7.3 μ long; hyphae amyloid. The balance of the carpophores of the type collection seems to be preserved in the Cooke Herbarium (K), but is heterogeneous, one specimen at least being identical with the holotype, the other being different. The entire collection goes under No. 297. It comes from Surinam.

The type of *M. castaneus* Mont. from French Guyana (P) is also heterogeneous, but the original description points clearly to the specimens identical with the holotype of *M. atrorubens* as being also the holotype of *M. castaneus*. There is a specimen in the Patouillard Herbarium (FH) determined by Patouillard as „*M. castaneus* Mont.!". There seems to be little doubt as to the fact Patouillard had compared this with *M. castaneus*, type, and that this is the first

choice of a lectotype for *M. castaneus*. Mont. The spores are scarce; basidiospores measuring 8 × 3.2 μ and 15 × 4 μ were found (one of these has to be foreign). The stipe is short-hirsute with erect hairs as described and illustrated by Dennis for *M. atrorubens,* i.e. subulate with needle sharp acute tips, 35—70 × 6.5—11 μ (and longer, nearer the base). Lamellae adnate, not collariate, acystidiate, but edges with cheilocystidia identical with the broom cells of the pileus; epicutis of pileus consisting of a hymeniformly arranged layer of broom cells which are 12—17.5 × 4.3—11 μ, hyaline below and with golden yellow apical erect setulae, 2.6—6.5 μ long. This is Duss 1765. It grow on dicot leaves, fallen to the ground, and had fulvous pileus. Unfortunately, neither the two types nor the Patouillard material show enough spores to determine their size. Dennis did not find any spores in the type of *M. jamaicensis* Murr. which he considers to be the same species.

Later „authentic" specimens of *Marasmius atrorubens* are misdeterminations which caused Montagne to redescribe the species.

Marasmius nummularius var. *rubroflavus* Theissen differs from the above as indeed from all species known to me in this group by less close lamellae. It was therefore elevated in rank, since the species of which it was supposed to be a variety is a synonym of *M. fulviceps* Berk. which does not occur in the Western Hemisphere (see Extralimital species), and was published by me as *M. rubroflavus* (Theissen) Sing. (1951). *M. fulviceps* Berk. = *M. nummularius* Berk. & Br. has close lamellae and pleurocystidia. I found no cystidia in the preparation from the type of the variety but they may be present; I also found no spores. Theissen indicates the spores as 6.5—7 × 4 μ. The broom cells of the edge of the lamellae and the epicutis of the pileus are about 11 × 7.5 μ and hymeniformly arranged, with hyaline to (mostly) yellow erect apical setulae. The lamellae are subdistant and adnexed without collarium; the stipe is pubescent all over and has fulvous basal tomentum which is strigose; it grows on dead leaves. This South Brazilian species is closely related to *M. actinopus, M. bahamensis,* and *M. atrorubens.,* but differs in subdistant lamellae, and probably in color, possibly in spore size. Certainly, if Theissen' s spore measurements are correct, the spores are very much smaller in *M. rubroflavus* than in *M. bahamensis.* Dennis has also studied the types of *M. jamaicensis* Murr. and *M. portoricensis Murr.* (Kew Bull. p. 204, 1951, fig. 17, and p. 201—202, fig. 11). Although the lamellae of *M. jamaicensis* are called rather crowded, and those af *M. portoricensis* subdistant, it seems, judging by the pictures, that the lamellae of both species are about subdistant (about 14 through-lamellae in each). It is, therefore, more probable that these two species are synonymous with each other and *M. rubroflavus* (which would itself fall into synonymy

because, as species, Murrill' s binomials have priority) than with *M. castaneus* Mont., i. e. *M. atrorubens* Berk. Since the spores are unknown in Murrill's two species as well as in *M. atrorubens*, a final decision on this matter cannot be made until fertile material of the species concerned is found. Until such time, I shall temporarily use the binomial *M. rubroflavus* for the species with subdistant lamellae and presumably small spores.

The type of *Marasmius actinopus* Mont. consists of two sets of syntypes in PC and K („Tecum divido nov. spec." Mont. ad Berk.) which are in good condition and apparently identical with Dennis' s material from Venezuela. Epicuticular broom cells e gr. 17.5 × 9.8 μ, setulae 5.5 μ long, rather acute; hymenial cystidia none; hyphae strongly amyloid. I have not studied the fibrillosity of the surface of the stipe which, according to Dennis consists of cylindrical hairs.

The type of *M. bahamensis* Murr. (NY) was analysed and redescribed together with identical material from Florida. At first glance, one may assume that this species is too close to *M. actinopus*, but the difference in the color of the basal tomentum seems to indicate that they are different. See Lilloa **25**: 484. 1952.

Marasmius setulosifolius Sing. ad int. (Fig. 27).

Pileus fulvous, somewhat sulcate on the margin, not rugose, size of *M. leoninus*. — Lamellae brownish, narrow to moderately broad, adnexed to adnate or subdecurrent, the latter attachment only where the stipe has enlarged apex, occasionally with some scattered interlamellar veins, in other caps entirely smooth, very distant. — Stipe rather light colored, buffy alutaceous, smooth and glabrous but with distinct basal tomentum which is strigose, white, and with some fulvidous or buff fibrils intermixed at the tips of the strigose fibers. — Context whitish, tough. — Spores not found; basidioles all over incl. edges, interlamellar spaces, and often the apex of the stipe beyond the lamellae, alternating with numerous, almost crowded, thickwalled broom cells, likewise all over the area of the hymenial layer, cylindrical to clavate and hyaline with apical but strongly spreading long acute setulae which are simple or rarely forking and 7—19 μ long, golden melleous, main body 8.5—25.5 × 4.3—9.5 μ; aside from these, no cheilocystidia or pleurocystidia differentiated; epicutis hymeniform, consisting of broom cells which are thin-walled and hyaline, the main body mostly cylindrical, entire cell including setulae about 23 μ long, setulae spreading less than in the setae of the hymenium (about 15.5 μ), acute, 7—7.5 μ long, golden melleous; hyphae of the trama thin-walled, later intermixed with some thickwalled hyphae, all strongly amyloid. — On dicotyledonous leaves fallen to the ground, Panamá Canal Zone, Rio Sardinilla, July 10, 1952, Martin & Welden 7553, (IA).

This is an interesting species because of the setose broom cells which are not restricted to the edge of the lamellae. It is apparently close to *M. rhabarberinus*. Unfortunately, there are no spores in the entire collection.

Marasmius spegazzinii Sacc. & Syd. (Fig. 28).

This is a nomen novum for *Marasmius balansae* Speg. non Pat. The type of the species from Paraguay (LPS) has spores 7.5—8.5 × 3—3.3 μ but these are scarce; cystidia on the sides of the lamellae

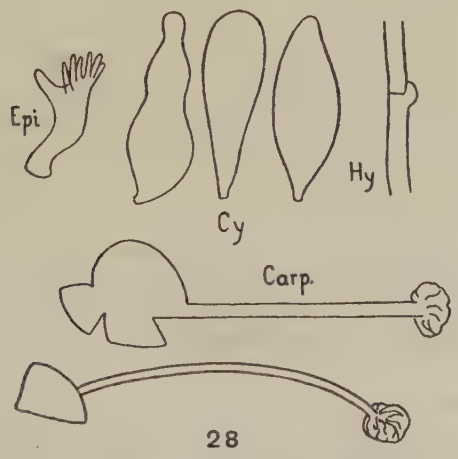

Fig. 28. *M. spegazzinii*. Epi, broom cell of the epicutis, × 1000. Cy, pleurocystidia, × 1000. Hy, hypha with clamped septum, × 1000. Carp., carpophores as preserved at LPS, natural size.

versiform, either attenuate upward and obtuse, or clavate with broadly rounded apex, or fusoid and then obtuse or acute, 21.5—30 × 8.7 μ, not or not much projecting and not very conspicuous in ordinary NH_4OH mounts; basidia 15—20 × 6.5 μ, mostly as basidioles which are fusoid; cheilocystidia are broom cells like those of the epicutis; epicutis of pileus hymeniform, consisting of broom cells, the latter 16—24 × 8.8 μ (below the setulae) with moderately thick wall, clavate below, or hand- to *Clavariella*-shaped and mostly spreading above, the setulae more often obtuse than acute 4—7.5 μ long, concolorous with the main body, i. e. light golden melleous, wall diameter about 0.5 μ; hyphae amyloid, with clamp connections. Pileus now about 17 mm. broad, perhaps somewhat rugulose, now distinctly fulvous, with smooth or subsmooth margin. Lamellae medium broad, close, rather free (?), interlamellar spaces slightly rugulose to smooth, or occasionally slightly venose. Stipe glabrous, about 42 × 1.5—2 mm., with white basal tomentum. These data were taken from the "saparado del tipe" i. e. the lecto-holotype. They coincide with the

results of earlier type studies by the author which were made on the remainder of the type collection (no. 4284 of Balansa, now left in the original envelope and re-numbered no. 2689 bis (herbarium number). The remarkable fact is that B a l a n s a himself made the following annotation in schedulis "Champignon de couleur blanche. Sur bois mort" S p e g a z z i n i in his original description ignored this note and called the pileus fulvirufescente, and, indeed, it is hard to believe that the color was originally white inasmuch as the entire broom cells of the epicutis are now colored, not hyaline. If this had been white, it would still be amply different from *M. haedinus*, the only white species of the cystidiate *Sicci,* by having close rather than distant lamellae, and much smaller spores. It seems, however, that this species is close to *M. ferrugineus* from which it differs likewise in close lamellae and smaller spores. The identification of *M. floridanus* Murr. with *M. spegazzinii* as proposed in a previous paper, seems improbable now that more data are known about the *Marasmii* of Florida.

A similar species keys out with *M. spegazzinii,* but comes from Richmond, Va. It differs in slightly larger size, more conspicuous cystidia, slightly more acute setulae on epicuticular and cheilocystidial broom cells, and in the habitat (on leafmold instead of "ad ramos ramentaque"):

M. virginianus Sing. spec. nov. ad int. Pileus tawny, the umbo slightly darker, in dried condition "rust sorolla" (M & P) at margin and on disc, with a lighter colored zone between them (pl. 12 G 11 M & P), with short furrowed but not sulcate or striate margin, slightly crenate or entire, glabrous, campanulate, becoming more applanate, 38 mm. broad. — Lamellae white, between narrowly adnexed and free, narrow, somewhat intervenose, distinctly intervenose in marginal half of pileus, close. — Stipe concolorous with the pileus in the upper portion, "Mars brown" (R.) toward the base, equal, glabrous, more or less shining, 63 × 2 mm.; basal strigosity present, mycelium whitish, at stipe coarse and somewhat fulvescent. — Context very thin, white. — Spores (6)—6.8—7.5(8.5) × 2.2—3.2 μ, smooth, hyaline, inamyloid; basidia 14.6 × 4.7 μ; cystidia somewhat projecting beyond the level of the basidia, very distinct in ammonia and KOH, hyaline, smooth, versiform, cylindrical or clavate with or without an appendage or mucro, with or without one to three apical constrictions, 30—56 × 7—11 μ, rather numerous on both edges and sides of lamellae; edge consisting of basidia, cystidia, and a number of rather scattered broom cells which are identical with those of the pileus, only most of them slightly paler and narrower; broom cells of the epicutis of the pileus, 11—25 × 3—8.7 μ, erect, rarely ascendant, orange-pallid to orange-ochraceous all over (incl. main body), setulae mostly acute, 6.7—10 μ long and 2—2.3 μ broad at their base, numerous

and erect to suberect, the deeper colored ones more or less isolated among numerous paler ones, and therefore surface of pileus mottled under the microscope; hyphae of the hymenophoral trama subparallel, thin-walled to moderately thick-walled, amyloid, homogeneous, with clamp connections. — On leaf mold and petioles of frondose trees. Richmond, Va., U.S.A. D. H. Linder, September 10, 1934, FH.

There is another cystidiate species of this group indicated as occurring in the northern hemisphere, viz. *M. wilsonii* Murr. However, according to the original description, and material I have compared superficially as well as according to the type studies on this species published by Dennis (Kew Bull. p. 209, 1951) this seems closer to *M. spegazzinii* than to *M. virginianus*; certainly, it is much smaller than the latter. It has, like both these species close lamellae and pleurocystidia (Dennis). It was described from Puerto Rico, and the type is preserved at NY.

There is a bare chance that all three species are merely extreme forms of a variable species distributed from Virginia south to Paraguay, and very variable in carpophore size, and several other perhaps minor characters. This is the reason we indicate this temperate species in the present paper, and why we refrain from describing it validly.

Marasmius haedinus Berk.

The type from "Panuré", Amazonas, Brazil, is Spruce 31 (K) and looks somewhat like the species around *M. niveus* but has epicuticular broom cells. The trama is amyloid and the hymenium contains many refractive cystidia. No spores were recovered from the type specimen, but they are 12—15 × 3 μ according to Dennis who was able to rediscribe the species from fresh material (Trans. Brit. Myc. Soc. **34**: 420. 1951).

Marasmius haedinus var. *minor* forma *brevispora* Dennis, l. c. p. 421 could be *M. spegazzinii,* always assuming that the type of *M. spegazzinii* was white.

Agaricus ferrugineus Berk.; *Marasmius leoninus* Berk. sensu Dennis; *Marasmius haematocephalus* (Mont.) Fr. sensu Mont. (1854 non al.): (Stirps *Ferrugineus*).

It is remarkable that in this important and variable group of fulvous cystidiate forms with glabrous stipe, there is not one valid name to be used. The species later known os *Marasmius ferrugineus* is the only one where the holotype corresponds to later collections under this name (not all); the two remaining species are later interpretations, not in agreement with the original holotypes.

(1) *Agaricus (Marasmius) ferrugineus* Berk. (Fig. 29).

Under this name, we find the original diagnosis of an important species which is usually cited as *Marasmius ferrugineus* Berk. However, it was transferred to the genus *Marasmius* only in 1869, by Berkeley & Curtis (Linn. Soc. Journ. Bot. **10**: 297. 1869) when it was recorded from the Wright collections from Cuba. The original type which was described from a collection by Gardner, from Minas Geraes, Brazil, exists in two sets, one in the Hooker Collection (K) which was analyzed by me, and one, identical, in the Berkeley set which was analyzed by Dennis who kindly communicated his findings to me (1952). Both sets of the type collection agree perfectly well, to the last detail, with a Brazilian collection of my own, and I am therefore in a position to redescribe this species (see below).

Unfortunately, the fact that this was originally described as *Agaricus* causes nomenclatorial difficulties since there is an earlier *Agaricus ferrugineus* Pers. ex Secr. which belongs in another family. The name *Marasmius ferrugineus* (Berk.) B. & C. is therefore not legal. In my notes, I have tried to use the name *M. poecilus* Berk. since part of the type of that species belongs here. Yet, the type collection is a mixed lot, and the carpophores with large spores, pleurocystidia, and basal strigosity (the latter overlooked by Berkeley), although belonging to the same species as *M. ferrugineus,* cannot be selected as holotype because their characters are evidently in contradiction with the original diagnosis which stresses the insititious stipe (see also under *M. poecilus*). Another later synonym is *M. paucifolius* Murr., according to Dennis, but I am convinced that, although it may be identical with Dennis's concept of the species, Murrill's fungus is not conspecific with the type of *A. ferrugineus* Berk. The lamellae are more distant, with absolutely smooth interlamellar spaces; the color of the pileus is wrongly indicated (for *M. ferrugineus*), and the whole carpophore is larger than *M. ferrugineus* becomes in Brazil. These are altogether too many differences, and I suspect that the spores are also slightly smaller. This may be the Cuban *M. ferrugineus* (Wright collection, FH), but the latter is sterile. Both this and Dennis's species seem to be closer to *M. helvolus* from which they differ in the numerous colored cheilocystidia. Under these circumstances, I see no other solution but the introduction of a new name: **M. gardneri** Sing. nom. nov. (*Agaricus ferrugineus* Berk., Lond. J. Bot. **2**: 630, 1843 non Pers. ex Secr.).

Pileus bright ferrugineous-fulvous when fresh, between "Titian" and "gold brown" (M & P) when dried, smooth or very minutely rugulose, with smooth, later sulcate margin, convex, 3—9 mm. broad. — Lamellae pallid to pale brownish, free to very narrowly adnexed, all equal (twelve through-lamellae), with finely rugulose or somewhat intervenose interlamellar spaces, distant, not collariate. — Stipe fuli-

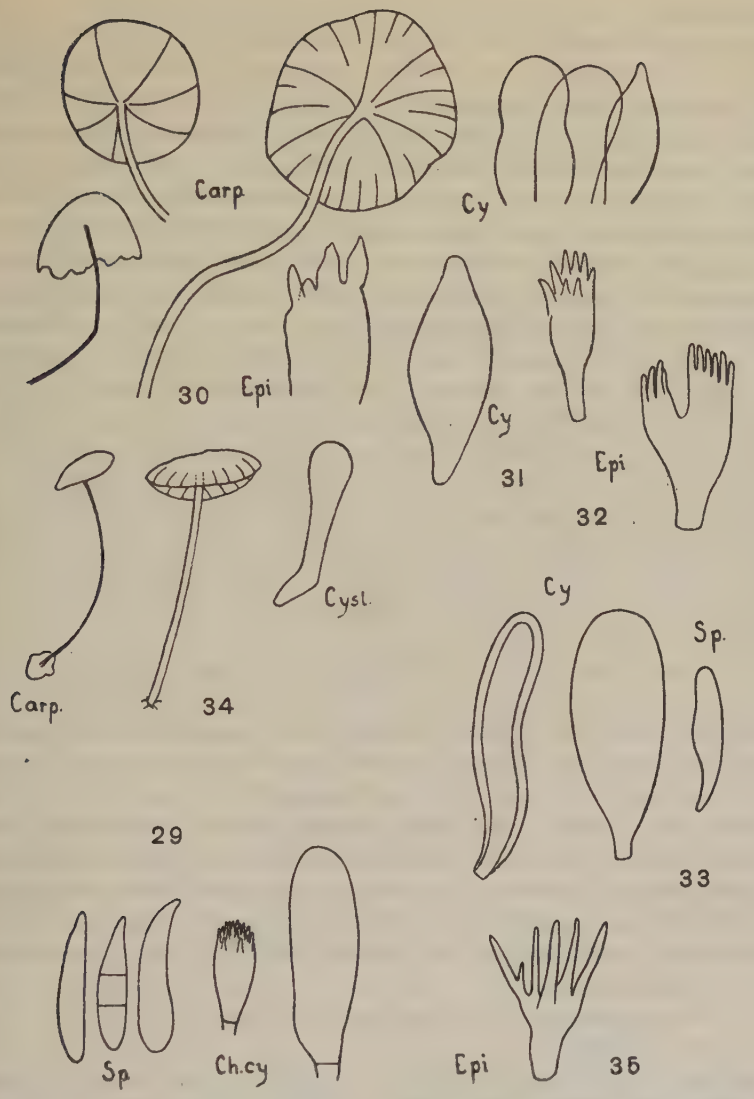

Fig. 29. *M. gardneri*. Sp., spores, × 1000. Ch.cy., broom cell of the edge of the lamellae, × 1000. Cy, pleurocystidium, × 1000.

Fig. 30. *M. montagnei*. Carp., carpophores as preserved at P, nat. size. Epi, broom cell of the epicutis, × 1000. Cy, pleurocystidia, × 1000.

Fig. 31. *M. anomalus*. Cy, pleurocystidium, × 1000.

Fig. 32. *M. coprophilus* sensu Sing. & Dig. Epi, broom cells of the epicutis, × 1000.

Fig. 33. *M. haematocephalus*. Cy, cystidia (metuloids). Sp., spore, both × 1000.

Fig. 34. *M. helvolus*. Carp. carpophores, nat. size. Cyst., pleurocystidium, × 1000.

Fig. 35. *M. glaucopus*. Epi, broom cell of the epicutis of pileus, × 1000.

ginous-umber, smooth, glabrous, shining, with white or whitish (sometimes intermixed with few pale fulvous-brownish fibrils) basal tomentum or strigosity, 14—28 × 0.2—0.3 mm. — Context of pileus white, extremely thin, inodorous. — Spores 13.5—22 × 2.8—4.3 μ, hyaline, fusoid to subulate or needle shaped, tear shaped, not amyloid, smooth, often tending to become 1—2-septate when overmature; cystidia numerous on the sides of the lamellae, 28—46 × 7.2—12 μ, versiform, often ventricose, cylindrical, or ampullaceous, with rounded apex, hyaline, or some of them pale melleous, moderately conspicuous to conspicuously opalescent and refringent; cheilocystidia are broom cells similar to those of the epicutis of the pileus, golden melleous in KOH; epicutis hymeniform, consisting of broom cells with hyaline main body and golden yellow to melleous apical setulae (often alternating with melleous hyaline apiculate broom cells), 14—18.5 × 6—11 μ, setulae about 4—5.5 μ long, narrowly conical but subobtuse; hyphae hyaline, thin-walled, with clamp connections, amyloid. — On the veins of a fallen leaf (dicot), and on the bark of dead trees, in tropical forest. Brazil, est. Amazonas, São Jeronimo, Spruce 139 (part), det. Berkeley (as *M. poecilus*), K, FH. — Est. Minas Gerais, Gardner, type, K. — Est. Rio de Janeiro, Angra dos Reis, Singer B 437, F.

The type of *Marasmius poecilus* Berk. is heterogeneous, a fact Berkeley must have noted himself since there is a schedula on the label of the Kew type saying "Possibly under this name are included two species". The type comes from "Panuré" (São Jeronimo), Brazil (K, FH). In the Farlow type, the specimen with the pileus turned up, somewhat larger and better preserved than the others, with numerous spores present, is undoubtedly identical with *M. gardneri (M. ferrugineus)*. However, for reasons indicated above, this portion of the type cannot be selected as the lecto-type. The remainder is not determinable. Consequently, *M. poecilus* will have to be considered as a nomen dubium.

(2) *Marasmius haematocephalus* (Mont.) Fr. sensu Mont. (1854), (Fig. 30).

As for Montagne's Guyana material from French Guyana (PC), both collections seem to belong to the same species. Leprieur 990 contains spores and the sides of the lamellae are cystidiate. Spores 15—20 × 3—4.5 μ, smooth, hyaline, inamyloid; cystidia not very strongly differentiated in NH_4OH, more so in KOH, and strongly in the Melzer, e. gr. 35 × 11 μ, ventricose or clavate, mostly broadly rounded above, some acute; epicuticular broom cells hymeniformly arranged, subhyaline below, often with a chestnut colored zone above and otherwise golden melleous including the setulae which are about 5—6 μ long and cylindrical to subulate, obtuse to subacute; same kind of broom cells present at edge of lamellae, as cheilocystidia;

hyphae amyloid. The pileus now 14—30 mm. broad; lamellae either with or without venose anastomoses, seven to twelve through-lamellae, with (in the carpophore with intervenose lamellae) or without lamellulae, free to narrowly adnexed; stipe light to deep fuscous, slightly shining, glabrous, about 0.3—1.5 mm. broad, base of stipe broken off. In the collection Leprieur 1023, we find more or less the same characters, but the lamellae are more strongly adnexed to almost adnate, very distant (12 per 25 mm. pileus diameter) and strongly intervenose-reticulate; stipe as above, but with a complete base showing a well developed basal strigosity which is whitish with fulvous extremities (outer tips of fibrils), The color of the pileus could never have been red. This has the aspect of a species colored as *M. ferrugineus* (= *gardneri*) when fresh, and it is, indeed closely related to *M. gardneri* Sing. differing from it mainly in the relatively much more distant lamellae and the considerably larger size. Whether there are still other coordinated characters distinguishing the two species cannot be established now, but it must be admitted that the possibility remains that the two are merely extreme forms of a species with a wide area and variable macromorphological characters. Lacking data confirming such an assumption, I propose to call this misdetermined *M. haematocephalus* from the Guyanas **M. montagnei** nom. nov. ad int. It will appear as such in the keys.

Another closely related species of the *ferrugineus-montagnei* group (stirps *Ferrugineus*) is that described by D e n n i s as *M. leoninus*. Af for the type of *M. leoninus* Berk., it differs as we shall see below, in much smaller spores and absence of cystidia, slightly different lamellae, and white basal tomentum. D e n n i s's species as described and illustrated by him (Trans. Brit. Myc. Soc. **34**: 419, pl. 19, fig. 1, 1951) was restudied by me (K) and found to correspond well to the description cited. The lamellae are rather variable, from narrowly adnexed to adnate; the basal mycelium is white; the spores about 15×2.7 μ, the tissue strongly amyloid, and the cystidia on the sides of the lamellae conspicuous (D e n n i s 42 A). This places the species near *M. ferrugineus* (= *gardneri*) from which it differs in larger size (pileus 15—50 mm.), less distant lamellae, slightly less elongated spores, non-plicate-sulcate margin, and habitat on bamboo. It differs from *M. montagnei* in much closer lamellae, and perhaps slightly smaller spores and habitat, but there is a possibility that the two forms are linked by transitional forms. However, until such forms can be found, there is no basis for the assumption that they are identical, and I propose to call *M. leoninus* Berk. sensu D e n n i s **Marasmius dennisii** Sing. ad int. The respective interim names will be used in the key to the species of this section.

Marasmius anomalus Lasch apud Rabenhorst.

The type from Driesen, Germany (FH) is in good condition (Klotzsch Herbarium vivum 1806). All anatomical characters as in *M. epodius* Bres. var. *microsporus* (R. Maire) Kühner. This is therefore identical with the type variety of *M. anomalus*. In South America (Argentina) the type variety of *M. anomalus* occurs (description, see Singer & Digilio, Lilloa 25: 207. 1952) ad a large spored form, which, however, is extremely long-stemmed, corresponds, except for being acystidiate, to *M. coprophilus* Speg. The former is not problematic and does not warrant further comments. It is the form which was formerly known as *M. litoralis* var. *microsporus* Maire with which it coincides in every particular (see f. ex. Kühner, Le Botaniste **25**: 101. 1933). It is also the same as *M. graminicola* Speg. the type of which (LPS) from the province of Buenos Aires was analyzed before (see Singer, Lilloa **25**: 486. 1951). There is also a larger-spored form which is the type form of *Marasmius epodius* Bres. (type from Italy, S); the latter form was not observed in South America.

The type form of *M. anomalus* Lasch occurs, in South America, in the cooler regions (Buenos Aires pampa; montane meadows). In the subtropical and tropical zone proper no such specimens were collected. It is possible that *M. coprophilus* Speg. which is cystidiate, is merely a form of *M. anomalus*. It comes from a montane, subxerophytic region (Alta Gracia, prov. Cordoba). In the lower subxerophytic woods and marginal forests of the North, a very similar species has been observed which Singer & Digilio described as *M. coprophilus* Speg., not without stating the fact that it is rather aberrant. This species might have to be renamed eventually (Fig. 32). It differs from the type in having no cystidia whatsoever on the gill faces. Although growing in forested areas, it always grows on old cow dung, this and the type *M. coprophilus* Speg. being the only *Marasmii* known to me (with the exception of *M. albogriseus*, at times) that grow on that substratum. A complete description has been given in Lilloa 25: 209. 1951.

While, in the dung-inhabiting forms, the base of the stipe is always clearly tomentose to strigose from the white mycelial tomentum, the graminicolous form (*M. anomalus*) is often so buried in earth that the basal mycelium does not always show distinctly unless carefully cleaned, and even then, one may encounter an occasional stipe where the basal tomentum is rather poorly developed.

Marasmius hinnuleus Berk. & Curt.

The type from Cuba (K, FH) was studied by me, but I did not search for cystidia. In a specimen collected by L. W. White at Cienfuegos, Cuba, compared macroscopically with the type specimen, cystidia were numerous, fusoid to clavate and frequently appendicu-

late-mucronate; cheilocystidia are broom cells like those in epicutis; hyphae clamped. Spores 10.5—17 × 3.8—4.2 μ; basidia 28 × 5.2 μ; epicuticular broom cells hymeniformly arranged, clavate with bright melleous-ferruginous 3.5—6.5 μ long setulae, 14—25 × 4.3—5.3 μ, spread above 5.5—8.5 μ. This grew on *Cecropium*. The pileus was rusty-cinnamon. The best and most reliable character also visible in the type are the brown strigose fibrils at the base.

Agaricus haematocephalus Mont.; *Marasmius helvolus* Berk. (Stirps *Haematocephalus*).

The original description of *Agaricus haematocephalus* reads:

"Pileo convexo, plicato, rubro-sanguineo, lamellis paucis, subcultriformibus, pallescentibus, stipite levi, umbrino, basi dilatata, membranaceo-adfixo. Ad folia dejecta prope Rio de Janeiro." ... "Stipes glaberrimus, seta porcina vix crassior, 1—2 poll. longus, cinereo-fuscus, nitens, intus subfistulosus, filamentosus, apiceque rube basi in membranulam orbicularem pallidam dilatatus. Pileus membranaceous, tenuis, umbraculiformis, sanguineus, 4 lin. latus, disco obscuriore rugulose (exsiccatione), radiatoplicatus, margine observe crenato. Lamellae paucae, distinctae, aequales, albidae, subventricosae, postice valde attenuatae, stipite contiguae. Sporidia ..." Ann. Sc. Nat. (Bot.) Sér. 2, **8**: 369. 1837. This was collected by Saint-Hilaire. It is not represented in the collections of the Paris Museum. But I have collected it in the neighboorhood of Rio de Janeiro, and find *M. haematocephalus* sensu Murr., Petch, Singer & Digilio one of the commonest species there. Moreover, this original diagnosis and description given by Montagne is about the best description of a tropical agaric published before Patouillard. Reading it carefully, one will admit that it agrees word by word exactly with *M. haematocephalus* sensu Murr. Petch, Singer & Digilio, and excludes any other interpretation. The species was subsequently transferred to *Marasmius* by Fries (1838) who described a similar, undoubtedly identical species from Mexico as *M. rhodocephalus* Fr. This latter was again redescribed by Cooke & Massee (1889) as *Marasmius sanguineus* (K) and by Murill as *M. atropurpureus* Murr. (NY). The type of Fries' s species does not exist in Uppsala, but the types of the last two species are preserved.

In spite of the correct and unmistakable first account, the same species was not only redescribed under other names, but was misinterpreted, first by its own author who believed to have received it from Leprieur (no 990 and 1023) whose specimens he considered as a „brunnescente-rufus" colored variation. These collections belong in stirps *Ferrugineus* see *M. montagnei* Sing. They have nothing to do with *M. haematocephalus* in the original sense although the spores and cystidia are similar. Dennis (1951) interpreted *M. haematoce-*

phalus again in a different way, calling so an orange to orange red species which is not sulcate and does not occur in Brazil. Microscopically it differs in much smaller spores and absence of cystidia. Dennis named the true *M. haematocephalus M. tageticolor* but we have seen that the type of the latter is acystidiate.

M. haematocephalus (Mont.) Fr. is typically, as the description shows, uniformly blood red, purple, deep purple (not violet). This color form can be subdivided into two pigmentation forms whereby the common one of Central Brazil which is also widely distributed from Florida to Argentina has melleous setulae on the epicuticular broom cells. Another, rare form, has the broom cells entirely deep purple red as in *M. polycladus*. This form was found in Cienfuegos, Cuba. Furthermore, there is a striped form, with dull blood red and pink alternating radial stripes all over the pileus, a form that was originally callod *M. tageticolor* Berk., but is not identical with the type material of the latter. This is also widely distributed from Cuba and Panamá to Argentina. Furthermore, there are brownish red forms which might be called transitional between *M. haematocephalus* and *M. helvolus*. Such forms were found in Argentina, and seem to be identical with what is described from Ceylon as *M. semipellucidus* Berk. & Br. And finally, there is *M. helvolus* (see there) which is identical with *M. haematocephalus* and *M. semipellucidus* in every regard but color, and may eventually enter what we call the stirps *Haematocephalus,* as a mere variety. For the purposes of the present paper, we are content to maintain the status of the described taxa of this group.

M. haematocephalus var. *haematocephalus* (Fig. 33). Type variety, unicolorous, broom cells not entirely red. Type: Montagne's original description, near Rio de Janeiro, Brazil; topotype: Angra dos Reis, Rio de Janeiro, Singer B 425, F. — Synonyms: *M. sanguineus* Cooke & Mass.; *M. atropurpureus* Murr.

M. haematocephalus var. **oenechinus** Sing. var. nov. — A var. *haematocephalo* differt elementis epicuticularibus vinaceis. Type: Soledad, Cienfuegos, Cuba W. L. White on stems and leaves of *Cecropia palmata,* FH. — Syn.: *M. sp. aff. haematocephalus* Sing. Lilloa **22**: 333. 1951.

M. haematocephalus var. **pseudotageticolor** Sing. var. nov. — Aberrat pileo radiatim rubello et pallide variegato. Type: Rio Sardinilla, Panamá, on fallen leaves of dicotyledoneous trees or shrubs in tropical forest, coll. W. G. Martin & A. M. Bouché 7549, F, IA. Also in Cuba, Argentina (the latter collection described in Lilloa **25**: 204, 1951, as *M. tageticolor*).

M. haematocephalus var. **transiens** Sing. ad int. — Described as *M. helvolus* „ejemplares argentinos" in Lilloa **25**: 203. 1951. Type: Tucumán, Argentina, on dicot wood in subtropical forest,

Singer T 171, LIL — Syn.: *M. semipellucidus* Berk. & Br. sensu Petch (type not studied; but Petch compared the type, and his material is partly topotypical)? *M. pallescens* Murr. (small form; may also be a pale form of *M. gardneri* Sing. as suggested by Dennis, in either case — a synonym.)

Key to the varieties and species of stirps *Haematocephalus.*

A. Pileus light purplish blood red to deep purple red, not striped.
  B. Epicuticular broom cells deep vinaceous purple. Var. *oenechinus*
  B. Epicuticular broom cells melleous Var. *haematocephalus*

A. Pileus not so colored, or radially striped with pallid whitish.
  C. Pileus radially striped with alternating reddish and whitish stripes; carpophores and spores mostly very large. Var. *pseudotageticolor*
  C. Pileus not radially striped in this manner.
    D. Pileus varying from „Spanish cedar" or „maroon" to „Indian red" (M & P) when fresh, becoming paler cinnamon or spadiceous when dried. Var. *transiens*
    D. Pileus without any reddish or pinkish tinge, „hazel" when dried, cinnamon (pl. 9 D 6 to 13 B 10) when fresh (see *M. helvolus*)

M. helvolus Berk. (Fig. 34) was first described from „Panuré", Brazil (K, FH), from a collection by Spruce (no. 130). This specimen has the pileus color of the numerous collections made and determined by us under this name, viz. „hazel" R. It has distant lamellae, all equal; shining, glabrous, light tan colored stipe with white basal mycelium, habit of *M. haematocephalus.* The microscopical characters coincide well with those of the type variety. Spores were found only in one of the carpophores (14—19.5 × 4.3—5.3 μ), and are scarce in the type; cystidia on sides of lamellae numerous, deep blue in cresyl blue mounts and there well differentiated, mostly clavate and broadly rounded above, but rarely with a small mucro, usually geniculate at base, 25 × 7.2—10.5 μ; epicutis hymeniform, consisting of broom cells which are crowned with either broom or melleous-yellowish setulae and therefore mottled; hyphae of two kinds, one little colorable in cresyl blue, the other distinctly metachromatic, i.e. either pale blue or deep pink to purple, all hyphae with clamp connections, amyloid.

I can see no valid difference between this and the species described by Singer & Digilio as *M. helvolus.* It was then (Lilloa **25**: 203—6. 1952) discussed whether or not this is merely a color variant of the pink to purple type. This question was mainly based on the existence of „transitional" color forms in Argentina. Meanwhile, we have become rather convinced that *Marasmius semipellucidus* Berk. & Br. and perhaps *M. pallescens* Murr. are precisely identical with these transitional forms which represent, apparently, merely one of the varieties of *M. haematocephalus.* It might then be considered logical to treat *M. helvolus* as another variety of *M. haematocephalus.* However, for the purpose of the present paper and for the keys, we use the binomial *M. helvolus.*

Dennis describes a *M. helvolus* which is acystidiate, and may well be a form of *M. longisporus*. Berkeley & Curtis described a *M. helvolus* var. *leucophyllus* Berk. & Curt. which seems to be somewhat different from *M. helvolus* as defined above. It is likewise a large-spored (spores 20.5—20.7 × 4.5 μ), cystidiate species but has a more fulvous-ferrugineous pileus („Kaiser brown" R. when dried) and would key out with *M. gardneri.*

M. floriceps Berk. & Curt. was indicated as one of the synonyms of *M. haematocephalus* by Murrill. The type from Cuba (K) was „laete rubrofusco", but the color as ist is now is rusty chestnut. Cystidia in KOH not clearly visible, no cresyl blue mount made, but in iodine solution also no cystidia differentiated; epicuticular broom cells either melleous with deeper melleous setulae, or deeper chestnut color and surface therefore mottled, setulae acute; spores not seen. This would indicate that *M. floriceps* is not only devoid of purple color, but also of cystidia, and, consequently, is not even related to *M. haematocephalus* except for the fact that it belongs to the same section and subsection. Lacking the spores, a correct determination is impossible. But even the general appearance does not recall *M. haematocephalus,* especially since the stipe is too thick for that species. At present, I consider *M. floriceps* a nomen dubium.

Another related species is what Dennis described as *M. ferrugineus* (Berk.) and which he identifies with *M. paucifolius* Murr. I have studied neither of these, and can only observe that the discolored gill edge, the tawny color of the pileus, the relatively light colored stipe, and perhaps the relatively broader spores and more numerous lamellae suggest that this is different from *M. ferrugineus* (Berk.) B & C. = *M. gardneri* Sing. On the other hand, the stipe is described as blackish brown (which it becomes in the end, as it seems) and Murril indicates 8—12 lamellae, and bay colored pileus. Whether one or both of these species are identical with *M. gardneri* or *helvolus* or represent a third species, can not be told at present.

On the other hand, it is shown by the suggested synonymy of *M. haematocephalus* var. *transiens* with a Southern Asiatic species that the *Haematocephalus* stirps is believed to exist not only in the Neotropics. As a matter of fact, *M. haematocephalus* has been indicated for Africa, and since I have seen material of this species from that continent, I believe that this reference is correct. Furthermore, not only var. *transiens,* but the typical purple form has been indicated from Ceylon, and material collected by Petch (K) shows beyond any doubt that the species exists there. The existing Australian collections have not been revised, but I am inclined to think that *M. haematocephalus* is pantropical.

Androsaceus glaucopus Pat. (Fig. 35).

The type from Guadeloupe (FH), Duss 594, grew on *Chrysophyllum*. It is closely related with the following species. Spores 8.3—9.3 × 3.8—5 μ; cystidia thick-walled and somewhat opaque, fusoid-ventricose with obtuse apex, e. gr. 36 × 8.7 μ, rather numerous on the sides of the lamellae; cheilocystidia broom-cell-like; basidia 27—30 × 6.5 μ 4-spored; epicutis hymeniform, consisting of broom cells, these with hyaline base and long, subulate, obtuse to acute, brown setulae (6.5—10.3 μ long), trunk 4.5 μ broad, entire length about 25 u, spread about 19 μ wide; hyphae of pileus amyloid. The pileus is now deep spadiceous. The lamellae are said to have been glaucous; they are not intervenose and less close than in the following species.

Marasmius tener Berk. & Curt.

The type from the Bonin Islands (K) was studied by Dennis, see Kew Bull. 1951, p. 163, fig. 17, 1951. A species agreeing with the original description as well as with Dennis' s analysis of the type was discovered in the subtropical forests of Northwestern Argentina. It differs merely in beeing more definitely colored, but since pale forms do occur occasionally as well as bleached forms, I determine my species as *M. tener* inasmuch as the Cuban specimens of *M. tener*, according to Dennis, „look similar" to the type, and *M. pusio* seems also similar enough to be considered probably identical with *M. tener* (*M. pusio* is „fuscopurpureus" or „light yellowish brown"). Although *M. pusio* (1853) has the priority over *M. tener* (1860), I use, for the time being, the latter binomial, for two reasons, first because more data (including the Melzer reaction, are known for *M. tener* than for *M. pusio*, second, because *M. pusio* is a temperate species, not re-collected in the United States. Below, we give a detailed description of the South American collections:

Pileus „moresco" then pl. 10 D 9 or „apricot" to pl. 11 G 6 (M&P, i. e. salmon orange), sometimes paler, always eventually bleaching to almost pallid, smooth, later becoming weakly and coarsely shallowly sulcate, convex, soon becoming applanate, in primordia often with pilose margin, soon entirely glabrous, 2—5 mm. broad. — Lamellae pure white, tridymously intermixed, with 9—12 through-lamellae, subclose, broad, rarely very broad, seemingly adnate to the fleshy disc but actually subfree; spore print pure white. — Stipe entirely white when young, later becoming „Windsor tan" in lower portion and at maturity almost all over (with a small white apex which also disappears in some old dried specimens), usually central, rarely somewhat eccentric, equal, curved to geniculate, relatively short, 4—5.5 × 0.1 mm., up to beyond the middle beset with minute hairs of fibrils and appearing somewhat pruinose under a lens (seemingly glabrous when fresh, seen macroscopically), the pilosity

becoming denser towards the base it merges with the basal strigosity which is white or partly orangy-pallid, poorly discernible when wet, but actually abundant. — Context white, extremely thin, inodorous. — Spores (7.3)—8—9.5—(10.5) × 3.3—4.7 μ, inamyloid, smooth, hyaline, oblong, often applanate on the inner side; basidioles fusoid; cheilocystidia like broom cells of the epicutis, e. gr. 17.5 × 6.7—9.3 μ, all hyaline except near the margin of the pileus; cystidia numerous especially near the gill edge, but differing from the basidioles only in being broader and tending to become somewhat thick-walled at apex or base and having a large vacuole in the center in fresh material (KOH), slightly deeper colored in cresyl blue mounts but not strongly metachromatic, their wall remaining subhyaline in cresyl blue, much like cheilocystidia without appendages, not deep-rooting, broadly fusoid to fusoid-mucronate, 16.5—23.3 × 7.3—10 μ; trama of pileus and hymenophore hyaline, consisting of thin, filamentous, thin-walled hyphae which are distinctly amyloid; epicutis of pileus consisting of broom-cells forming a hymeniform layer; surface layer of stipe not forming a continuous stratum, consisting of numerous broom cells and, among them, more and more numerous towards the base, long hyphous hairs; broom cells 14—23 × 6—10 μ, on pileus usually broader, on stipe narrower and there at times reminding one of elements of the so-called *Rameales*-structure (*Marasmiellus*) whereby the main trunk of the cells is reduced to about 2—3 μ in diameter, hyaline, in the pileus with golden melleous to golden yellow setulae which are always thin, acute, or obtuse, sometimes forked or divided but more often simple, apical, more rarely some lateral, on stipe more often lateral; some of the hairs of the stipe simple, thick-walled, needle-sharp-acute or obtuse, hyaline or subhyaline, smooth, 1.3—2.5 μ broad, others branching near the base and often one branch transformed into a broom cell or at least with 2—3 setulae white the other is pilose; setulae usually short, mostly about 2.3—2.5 μ long, but in the more irregular cells of the epicutis of the stipe sometimes much longer; hyphae of the stipe all parallel; all hyphae amyloid. — On fern rachis, more rarely on dead fallen twigs and branches (e. gr. of *Solanum)* and other woody matter, seriate and densely gregarious but not fasciculate, fruiting in summer (January until February) in subtropical forest, Argentina, prov. Tucumán, Yerba Buena, 600 m. alt., February 12, 1955, Singer T 2155, LIL.

This species, considering its size and habit, and its microscopical characters is unmistakable among all species of this section, and does not appear to be very close to any other species known to me.

Marasmius pusio Berk. & Curt.

The type from South Carolina has not been studied by me; see under *M. tener* (preceding species) and Dennis, Kew Bull. 1951, p. 162, fig. 16 1951, on a portion of the type collection (K).

Extralimital Species

Marasmius fulviceps Berk. (Fig. 36).

The type from the Hauton Range, Ceylon, no. 73 (K) has been studied previously (Type Studies on Basidiomycetes V, Sydowia **5**: 471. 1951). For the sake of comparison we give a complete description of this palaeotropical species (not occurring in South America, but replaced by related species such as *M. glaucopus*):

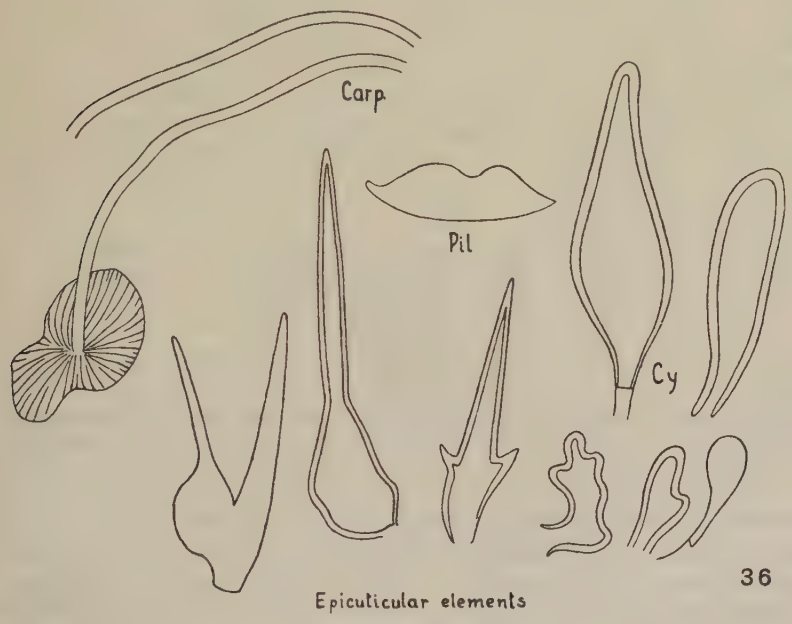

Fig. 36. *M. fulviceps*. Carp., carpophores as preserved at FH (from Africa), nat. size. Pil. Side view of pileus of same, nat. size. Cy, pleurocystidia (metuloids), × 1000. Epicuticular elements, × 1000.

Pileus „Sanford's brown" (R), dark rusty-fulvous when dried, convex with depressed center, sometimes young papillate, brighter fulvous on the more declivous but later applanate to uplifted margin, slightly sulcate when mature, 15—23 mm. broad. — Lamellae whitish to „light ochraceous buff" (R), close to almost crowded, narrow, or moderately broad, emarginate-adnexed to free; spore print white. — Stipe fulvous to bister distinctly (macroscopically) pruinate, but at times, in spite of this, more or less shining, smooth, with bright fulvous abundant basal tomentum, 50—85 × 1—2 mm. — Context white, thin in pileus, odor unknown. — Spores 15.5 × 4 μ; cystidia hyaline to melleous, versiform, often ventricose — ampullaceous or clavate, thick-walled, always obtusely rounded above, numerous, 35—42 × 7—11 μ; cheilocystidia like the broom cells of the epicutis,

but unicolorous; epicutis of pileus hymeniform, consisting of broom cells, which are melleous, with some deeper brown and thicker-walled ones interspersed, with very obtuse apical or subapical septulae or with few very elongate acute setulae, reaching occasionally 70 μ in length, 5—16 μ broad; hyphae amyloid, with clamp connections. — On decaying wood. Ceylon, type, (K). — Liberia, Du River, Harley 138, FH, det. Singer (as cf. *M. piperodorus* Beeli).

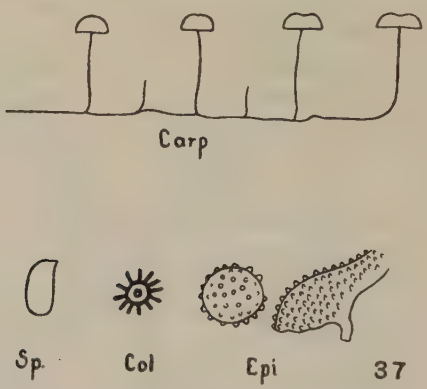

Fig. 37. *M. multiceps.* Carp., schem. view of carpophores as preserved at FH (type), nat. size. Sp., spore, × 1000. Col., collarium, schem., seen from below, with stipe cut off, about × 7. Epi, broom cells of epicutis, × 1000.

There are also specimens collected under this name by Petch. There, the hymenium consists entirely of cystidioles and the pileus is now golden ocher to olive ocher. (Petch 3505). This may be rather *M. bahamensis* Murr.

Section *Rotulae* Fr.

Marasmius rotuloides Dennis.

A collection that apparently refers to *Marasmius rotuloides* was sent to me, Martin & Welden 8733, from Barro Colorado Island, Panamá Canal Zone, Aug. 15—16, 1952. Pileus only 3 mm. broad and white, with a small umbo in a small depression, with very declivous margin, stipe 15 × 2 mm., black with whitish apex, on dead wood. — Spores hyaline, ellipsoid, smooth, inamyloid, 4.5—7.2 × 2.5—3.6 μ; basidioles fusoid; cheilocystidia dendrophysoid, vesiculose with short processes all over the upper portion, processes divergent, cells 15—23 × 11.3—16 μ; cystidia none; hymenophoral trama consisting of inamyloid hyphae with clamp connections, regular, hyaline; epicutis of pileus cellular-hymeniform, broom cells of the type of *M. rotalis* and similar to the cheilocystidia, hyaline, at times some few broom cells yellowish-fulvous, 18—23 × 14—14.5 μ.

It is quite possible that apex of the stipe is strongly amyloid as in *M. bulliardii* et aff., and then, the difference between this and *M. rotula* would be confined to the size of the carpophores and the spores. The pileus is slightly smaller in Martin & Welden's Panamanian material than in the type, but the spores are only slightly although demonstrably smaller than those of *M. rotula.* If this were a species replacing *M. rotula* in the tropics, it might be accepted without question, yet Saccardo describes, unfortunately without spore measurement, a *M. rotula* var. *microcephalus* (Syll. **5**: 541. 1887) from Northern Italy, on branchlets, trunks, etc. I have not seen the type. If the spores are smaller than in *M. rotula,* this would prove that *M. rotuloides* also occurs in Europe. If the spores are as in *M. rotula,* the difference between the tropical and the temperate species would boil down to a — for *Marasmii* — small difference in spore size and — for *Rotula* — slight difference in extent and intensity of the Melzer reaction. Since the true *M. rotula* is absent in the flora of tropical America, I am inclined to think that *M. rotuloides* is a good, vicariant species.

Marasmius multiceps Berk. & Curt. (Fig. 37).

The type from Cuba (FH) has spores 7—8.5 × 3.3—3.7 μ; epicuticular broom cells subisodiametric to strongly laterally extended and not strictly hymeniform, with coarse, mostly obtuse setulae which are somewhat divergent and remind one more of the *Rotalis*-type than of the *Siccus*-type, both main body and setulae subhyaline to hyaline, with similar but less irregular cheilocystidia on the edges of the lamellae; hyphae of the hymenophore and pileus inamyloid or extremely weakly amyloid. The carpophores branch off a repent rhizomorph (black) in a row, one after other, with erect individual stipes. There are 12 through-lamellae; lamellulae present in the larger caps.

According to Dennis who has likewise studied the type (K), the hyphae become light reddish brown in the Melzer.

Marasmius cupressiformis Berk.

I have not studied the type (K); the data used for its insertion in the key were taken from Dennis's type analysis, and a macroscopical comparison of the type material with the original diagnosis.

Marasmius defibulatus Sing. (Fig. 38).

Pileo albido, rugoso-striato, convexo, submammilato, glabro, 2—4 mm. lato. — Lamellis albidis, distantibus, lamellulis dimidiatis intermixtis, plus minusve decem integris, latiusculis, ad collarium adnatis. — Stipite nigro, glabro, nitido, tenerrimo, setoso, insititio, centrali, simolici, plus minusve 20 mm. longo, minus quam 0.5 mm. lato. — Sporis (6.5) 7.5—8.5 × 4.2)4.7—5.3 μ, ellipsoideis, hyalinis, levibus, inamyloideis; basidiis clavatis vel subclavatis, 24.5—26.5 ×

4.5—5.3 μ, bisporis; basidiolis fusiformibus; cystidiis nullis; cheilocystidiis cellulis echinatis epicutis pilei simillimis; epicute ex elementis apice crude echinato-verrucosis, hyalinis, haud manifeste hymeniformiter dispositis consistente; hyphis defibulatis, inamyloideis. — Ad fola delapsa *Palmarum,* Surinam, D. H. Linder (FH).

This is one of the *Rotulae* in which the epicutis becomes (or is?) indistinctly hymeniform or subirregular. The clampless hyphae and bisporous basidia are distinctive. The black stipe and the absence of cystidia exclude it from the section *Epiphylli* where clamp-less hyphae and bisporous basidia are also known.

Marasmius submultiformis Murr., *M. trichorhizus* Speg., *M. trichorhizus* var. *aripoensis* Dennis, and *M. populiformis* Berk. (Stirps *Populiformis*).

The species indicated above seem to form a group of closely related forms although some data are missing on some of them. The stirps may be characterized by the fact that they all arise from a common rhizomorphic strand by branching off alternately with a relatively short individual stipe. They grow mostly on dead wood. The spores are between 6 and 9 μ long, and 2.2—3.5 μ broad. As for *M. trichorhizus* Speg. (Fig. 39), we rely on the material from Paraguay deposited at the Spegazzini Institute which we take as authentic and, since the original type has been lost, probably typical for the species as known by Spegazzini. I consider it as lectotype. Material undoubtedly identical with the Paraguayan lectotype has narrow spores as indicated in our type studies on *M. trichorhizus* (see Lilloa **25**: 490. 1951), i.e. they are not broad as indicated by Spegazzini („7—8 × 4—5 μ"). It may be argued that a narrow-spored species, even a sterile specimen, cannot be designated as the lectotype of a species described as broad-spored. Yet since Spegazzini himself recognized both specimens as his *M. trichorhizus,* I have no compunctions in considering Spegazzini's published spore measurements as incorrect inasmuch as errors in this regard are not unusual in the publications on dried tropical agarics, especially by Spegazzini and many of his contemporaries. Consequently, *M. trichorhizus* Speg. is a species with abundant branched rhizomorphs, with spores 8.2—9 × 2.2—3.5 μ, without cystidia, with epicutis of broom cells which have, like those of *M. multiceps,* a tendency to become irregularly arranged in age, and with inamyloid hyphae (even the internal hyphae of the black rhizomorphs are inamyloid). As for the other forms of this stirps I refer to the type studies carried out and published by Dennis (l. c.) since I have not personally analyzed them. The validity of our arrangement depends on the assumption that the type of broom cells in all of them is identical, and that they all have inamyloid hyphae. I have not restudied *M. trichorhizus* var. *apripoensis* Dennis which differs from

the other species cited here by lacking the abundant rhizomorph development characteristic for the stirps as described above. It is, however, quite possible that this is a non-rhizomorphic foliicolous form of the ordinarily corticicolous or lignicolous type, a correlation between habitat and rhizomorph development sometimes observed. This could be accepted as as variety of *M. trichorhizus* only if the

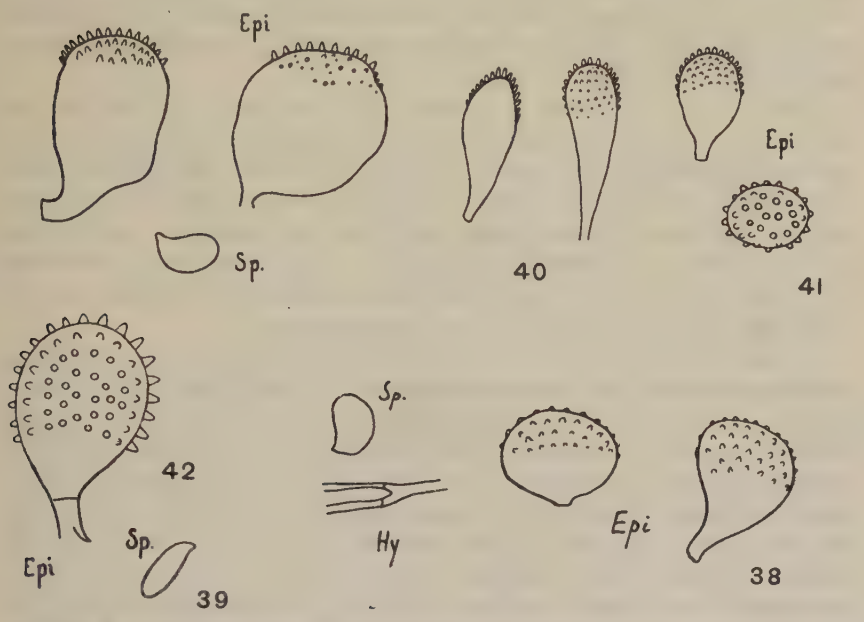

Fig. 38. *M. defibulatus*. Sp., spore. Epi, broom cell of epicutis. Hy, hyphal fragment with clampless septa, all × 1000.

Fig. 39. *M. trichorhizus*. Sp., spore, × 1000.

Fig. 40. *M. platyspermus*. Epi, broom cells of the epicutis. Sp., spore, all × 1000.

Fig. 41. *M. rotalis*. Epi, broom cells of the epicutis, from an exsiccatum (Sydow, coll. Petch, Ceylon), × 1000.

Fig. 42. *M. rotalis* sensu Sing. & Dig. Epi, broom cell of the epicutis, × 1000.

broom cell type and the iodine reaction of the Trinidad material coincides with that of the Paraguayan species, and if the broom cells of the pileus are not actually „red" as they are said to be in the original account given by Dennis.

Marasmius platyspermus Sing. in Sing. & Digilio (Fig. 40).

Nothing can be added to the original diagnosis.

Marasmius rotalis Berk. & Br. (Fig. 41).

The type from Ceylon (K) has broom cells on the epicutis of the pileus which are hymeniformly arranged; they are of a type com-

parable to the dendrophyses of the genus *Favolaschia,* and not of the *Siccus*-type. They are also much like those observed in the subsection *Genuini* of the section *Hygrometrici,* especially *M. ilicis* and related species. The trama of the pileus and the hymenophoral trama are non-amyloid.

This is obviously the same species as that distributed by Sydow, Fung. exsicc. exot. no. 301. Both have umber to olive umber colored pileus. In both, the broom cells of the epicutis are about 18—21 × 14—18 μ with the setulae projecting about 2.5 μ or less, spores here 7—8.2 × 3—3.5 μ.

Berkeley says that *M. rotula* var. *fuscus* Berk. & Curt. belongs here I have not studied the Cuban type, but if so, one has here the first indication that *M. rotalis* also occurs in the Western tropics. A collection agreeing well with typical *M. rotalis* but with the color slightly different (pileus more argillaceous brown to ochraceous brown "Aztec" to "chipmonk" M & P) was found and described by Singer & Digilio in Misiones, northeastern Argentina, see Lilloa **25**: 191. 1951, fig. 42 of the present paper.

However, I refrain from describing it as variety of the type form from Ceylon until the variation in color, as indicated by Petch is either corroborated or corrected. According to Petch, this species varies to yellow and orange and its spores range from the size indicated by us to a maximum of 12 μ in length. I have a suspicion that these larger spores refer to the orange or yellow caps exclusively, and that these, in turn, belong to what Petch calls *M. equicrinis* Mueller in Berk., the pathogenic fungus known as horse hair blight in tropical Asia. Petch describes the broom cells of the latter as "crowned with close-set blunt spines" which does not describe the type of broom cells observed in *M. rotalis.* Since, again according to Petch, *M. rotalis* is supposed to have the same kind of broom cells as described for *M. equicrinis,* it becomes even more probable that the two species were occasionally confused by Petch. As for *M. equicrinis,* see also under *M. guyanensis.*

Several European species are extremely close to *M. rotalis,* viz. *M. bulliardii* Quél., *M. limosus* Quél., and *M. wettsteinii* Sacc. & Syd. Of these, *M. limosus* is undoubtedly different. I have collected it in the Altai Mts., Singer A 280 (LE). It has nonamyloid pileus trama, as *M. rotalis,* the same broom cells, but grows on Gramineae, and has broader spores (8.3—10.5 × 4—5.8 μ). The tissue of the stipe is distinctly pseudoamyloid.

Marasmius bulliardii and *M. wettsteinii* present a more serious problem. The form on angiosperm leaves which was originally described by Kühner (Le Botaniste **25**: 99. 1933) as *M. bulliardii* Quél. is known to me. The pileus is ochraceous, wood color, creme color etc., and the trama of the pileus becomes very slowly and

very weakly amyloid while the apex of the stipe is strongly amyloid; spores as indicated by Kühner; i. e. usually smaller than 10 μ long (but according to "Flore analytique" up to 11.5 μ. It is said to occur also on needles of conifers. This form is also known to me. It would be *M. wettsteinii* but this is in all my collections, fresh and dried, light avellaneous-umber rather than ochraceous as both Wettstein himself and Kühner describe it. On the other hand, Quélet himself described his species (*bulliardii*) likewise as isabelline or brownish. My umber colored form from Germany on

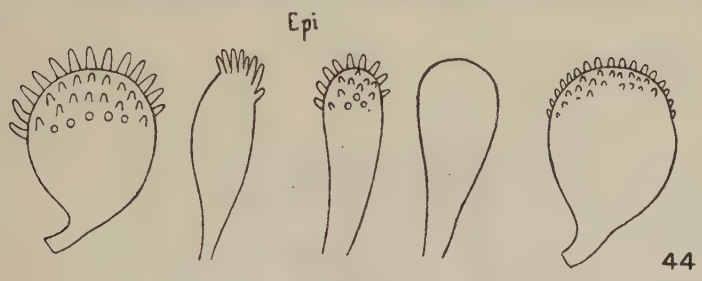

Fig. 44. *M. puttemansii*. Epi, broom cells of the epicutis, × 1000.

Picea needles has also more lamellae (15—16 rather than the 8—12 indicated for *M. bulliardii*); spores 6.5—9.3 × 3.7—4.7 μ, i .e. broader than in *M. rotalis*. The hyphae of the context of the pileus is only partly extremely weakly and slowly amyloid when hydrolyzed in the ordinary manner, but the apex of the stipe is strongly amyloid. In material preserved in the Herbarium Höhnel and determined, certainly correctly, as *M. wettsteinii*, the spores are 8.3—10.3 × 3.7—4.5 μ and the pileus trama is practically inamyloid. I drew from this the conclusion that *M. wettsteinii* and *M. rotalis* are conspecific. However, the present evidence seems to point rather to identity with *M. bulliardii* since the latter seems to vary a great deal more than was originally anticipated. In this case, the question comes up whether *M. bulliardii* and *wettsteinii* are not synonyms of *M. rotalis* (which has the priority). It must be left to the European mycologists to solve this problem. On the basis of my own data, I would be inclined to think that *M. rotalis* may have another range of color variation (from olive brown to more ochraceous brown), still less amyloid context, and, very slightly narrower spores. For our own aim, the question is not immediately important, but the status of *M. bulliardii* and *M. wettsteinii* should interest European mycologists, and this is the reason why the difficulties are discussed here at some length.

Marasmius puttemansii Henn. (Fig. 44).

The type from the Serra de Catareira, São Paulo, Brazil has probably been lost during the last war. However, the description

leaves no doubt whatever as far as the identity of the fungus is concerned since it was re-collected in Argentina and redescribed by Singer & Digilio. Some of our material grew on small sticks and branchlets, the most typical (exactly coinciding with Hennings's description)on evergreen leaves (*Phoebe porphyria*). This latter had distinctly rhizomorphic origin, and the stipes were sparsely branched, forming pilei at their tips. The dried material is between "Mandalay" and "clove" (M & P), and the epicuticular broom cells are dendrophysoid (dendrophyses of *Favolaschia* — broom cells of the *Rotalis-*

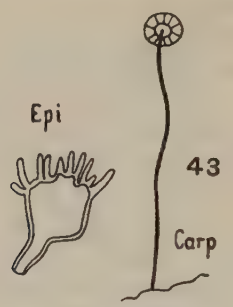

Fig. 43. *M. pallipes* sensu Sing. (from Brazil, coll. Rick), Epi, broom cell of the epicutis, × 1000. Carp., carpophore in nat. size.

type) although some of them have the setulae only on or near the apex, and those slightly below the apex ascend obliquely (semierect); nevertheless, they are, in their majority, definitely not of the *Siccus*-type.

Marasmius aciculaeformis Berk. & Curt.

Specimens from Cuba (FH) have spores 7.5—9.5 × 4—4.2 μ, hyaline, smooth- inamyloid; basidioles fusoid; basidia 25—27 × 7 μ; broom cells of the epicutis of the pileus hymeniformly arranged, yellow when seen from above (scalp) and hyaline in side view (radial section), with apical, little or not divergent, remarkably coarse, thick and obtuse setulae; cheilocystidia similar; hyphae hyaline, inamyloid. This species has thin, long, shining stipes which are insititious and umber colored, arising from chips of wood.

M. aciculiformis seems to be extremely close to *M. pallipes* Speg., and was identified with that species by Dennis. On the other hand, Dennis's *M. aciculiformis,* as described from Trinidad, is not exactly identical with either *M. aciculaeformis* Berk. & Curt. or *M. pallipes* Speg., or the interpretation of the latter given by Singer. Consequently, we are keying these species out separately from each other, without any prejudice regarding their possible identity. The spores of Curtis's material (FH) are definitely smaller than those of Spegazzini's.

Marasmius pallipes Speg. (Fig. 43).

The type from Brazil (LPS) has been analyzed by Singer as well as by Dennis. A complete redescription of the species has been given by both authors, Singer as *M. pallipes,* see Lilloa **25**: 486. 1951; Dennis who identified his material with *M. aciculiformis,* see Trans. Brit. Mycol. Soc. **34**: 419. 1951. Since there might be a vague possibility of a danger of mixing up similar but slightly different forms, the single collections are keyed out separately. The material referred to as *M. pallipes* sensu Singer was collected by Rick at São Canisio do Porto Novo, State of Santa Catarina, 1928 (FH).

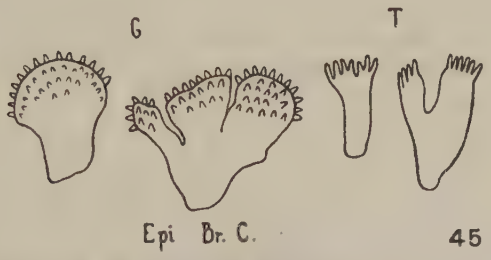

Fig. 45. *M. guyanensis.* Epicuticular broom cells, × 1000, G from the type (French Guyana), T, from M. guyanensis sensu Dennis, Trinidad.

Marasmius bromeliacearum Sing. in Sing. & Digilio.

Nothing can be added to the original diagnosis. The species is very similar to *M. pallipes* Speg. (see above) but has amyloid trama and somewhat smaller spores, also different habitat and color shade.

Marasmius guyanensis Mont. (Fig. 45).

The type from French Guyana (K) did not yield any spores. Broom cells of the epicutis subhymeniformly arranged, with apical, mostly erect and scarcely divergent rather coarse, deep golden yellow setulae, e. gr. 14.5 × 14.5 μ, setulae projecting 1—3 μ; hyphae of the pileus trama inamyloid.

This is said to be umber color. It seems to have a tendency to remain sterile, and the pilei are formed tardily. A collection by Dennis, under the name *M. guyanensis,* is not identical with the type. It has yellow pileus (instead of umber), and the dried caps are now "orange rufous" (R.); its hyphae, including those of the trama of the pileus and hymenophore are weakly but distinctly amyloid. There are no cystidia. The epicuticular broom cells are more decidedly of the *Siccus*-type than in the type of *M. guyanensis* (where they are much like the broom cells of *M. puttemansii*), 13—14.7 × 7.2—9 μ, setulae projecting 1.5—3.8 μ, deep golden yellow, gradually hyaline towards the base of the cell; the broom cells of the gill edge (cheilo-

cystidia) are similar but subhyaline (NH_4OH). Spores about 13 × 3.2 μ. This species does not seem to be identical with any other I know in the section *Rotulae,* and will have to be renamed eventually. I inserted it in the key as *M. guyanensis* sensu Dennis.

The spores of the true *M. guyanensis* remain unknown. The species will key out in both the small-spored and the large-spored group in the key.

What the relation between *M. guyanensis* sensu Dennis *non* Mont. and *M. equicrinis* Müller in Berk. sensu Petch as recorded from Ceylon really is, cannot be said at present. Petch indicates the spores as 10—14 μ and the colors seem to agree. On the other hand, a more careful comparison of all the details will be desirable before it can be proved that both are the same thing. I refrain from renaming the Trinidad fungus as long as it is not even known whether the Australian type of *M. equicrinis* Müller is in reality the same thing as the interpretation given by Petch.

Another species which deserves to be mentioned here, is *M. hiorami* Murr. I have to refer to the original description and the type study published by Dennis (Kew Bull. p. 199, 1951, where again similar spores are indicated). The colors as described do not coincide with those of *M. guyanensis* Mont. or with *M. guyanensis sensu* Dennis.

Marasmius arimana Dennis.

I have seen the type from Trinidad but have not analyzed it because the only existing collection, Dennis 391, consists of a tiny fragment which I did not dare section. It remains unknown whether the trama is amyloid or not.

Marasmius rufomarginatus Sing. spec. nov.

Pileus "English red", "orange rufous", or "Mars orange" (R.) becoming "salmon orange" or "Mars orange" in age except for the center which is "burnt sienna" (R.) in many specimens, deeply sulcate, deeply and narrowly umbilicate, when dried papillate with a minute obtuse wart in the center of a depression but not discolorous there, or at least not gray or blackish, hemispherical, then subhemispherical-convex, 0.8—3 mm. broad. — Lamellae white, eventually often becoming cream colored, with the edge concolorous with the pileus, at least in the region near the margin of the pileus, all simple or one to several forked near stipe, with 0—1 lamellula, 7—10 through-lamellae, at first indistinctly collariate (seemingly free but slightly low-connecting by an elevated ring around a deeper depression immediately around the portion of the central papilla of the pileus), later incompletely collariate, with the lamellae and collarium often not separating from the stipe on at least one side of the pileus,

distant, broad (1—2 mm. broad). — Stipe blackish brown or chestnut black with white to hyaline apex, shining, glabrous, insititious, 8—15 × 0.1 mm. — Context very thin, inodorous. — Spores ellipsoid-clavate, with the hilar end often strongly elongate and acute in overmature spores, hyaline, smooth, inamyloid, 7.7—9.3 × 3.5—4 μ, mostly 8.3—8.7 × 3.7 μ; basidia about 30 × 8—10.2 μ, 4-spored; cystidia none, or few and inconspicuous; cheilocystidia of the broom cell type, identical with the broom cells of the epicutis of the pileus; epicutis of the pileus consisting of a hymeniform layer of broom cells; these subhyaline below, with golden yellow subacute to obtuse conical erect or suberect setulae projecting 2—5.3 μ, 14.5—22.7 × 6—9.3 μ, of the Siccus-type; hyphae of the marginal portion of he pileus weakly but undoubtedly amyloid, at least some of them, hyphae of the extreme apex of the stipe strongly amyloid, all hyphae with clamp connections and thin walls (in the pileus), all parallel in the stipe. — On fallen leaves of *Nectandra coriacea* in tropical hammock, Florida, Dade Co., Simpson Park, Matheson Hammock, etc., October 1942, R. Singer no. F 1196, F 1196 a, F 1219 (type), F 1219 a. (FH).

Latin diagnosis: Pileo rubroaurantiaco vel rufo, leniter pallescente usque ad salmoneo-aurantiacum, sulcato, usque ad 3 mm. lato; lamellis albis vel cremeis, subcollariatis vel imperfecte collariatis, rufomarginatis vel prope marginem pilei ei concoloribus; stipite atrobrunneo vel castaneo-nigro, glabro, nitente, insititio, 8—15 × 0.1 mm. Sporis 7.7—9.3 × 3.5—4 μ; cheilocystidiis elementis epicutis pilei analogis; his setulis aureis apicalibus erectis vel suberectis praeditis, basin versus subhyalinis; hyphis fibuligeris, amyloideis. Ad folia dejecta *Nectandrae* in dumetis tropicalibus, Florida Meridionalis.

This species is apparently closely related to *M. ruforotula* Sing. from which it differs by its smaller size and foliicolous habit, by the absence of a dark spot in the center of the pileus, and by the incomplete or indistinct collarium. A comparison of other tropical species of Florida and the West Indies shows that this is not identical with any well defined species known at present. It is however identical with *M. exustus* Berk. & Curt., American specimens ("authentic"), as preserved at the Farlow Herbarium; at least this is the impression one receives from a comparison of the fruiting bodies. However, an analysis of the Bonin Island material (type of *M. exustus*) shows the Asiatic material to be clearly different from *M. rufomarginatus* Sing.

Marasmius rubromarginatus Dennis (Fig. 46).

The type from Venezuela consists of a single specimen (K) with inamyloid and smooth, hyaline spores, 9—16 × 1.5—3 μ; cheilocystidia like broom cells of epicutis of pileus; cystidia none; epicutis hymeniform, consisting of broom cells with apical erect setulae

(*Siccus*-type), clavate or handshaped, 23—29 × 10—13 μ, also smaller, with rather thin to thick walls; setulae up to 4.5 μ long, some broom cells deep melleous to brown, others hyaline; trama of the pileus inamyloid.

This species is close to *M. sanguirotalis* and *M. marthae* from Argentina but differs from both in narrower spores, from *M. marthae* moreover in negative Melzer (in pileus trama), and from *M. sanguirotalis* in very distinctly red gill edge.

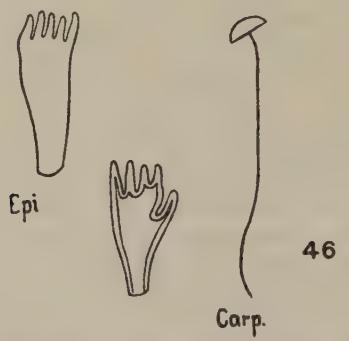

Fig. 46. *M. rubromarginatus*. Epi, broom cells of the epicutis, × 1000. Carp., carpophore in nat. size.

Marasmius ruforotula Sing.

The type from Matheson Hammock, Florida (FH) has been described in Sydowia **2**: 34. 1948, There are, however, several related forms, and the sum of these may be considered as a stirps continuing almost imperceptively, step by step, the series of forms combined in the stirps *Graminum*. The form still closest to *M. graminum* is var. *foliicola* which, although relatively deeply colored, has a more definite salmon tinge in the pileus; the lamellae are white, and only the broadest ones have the edge more or less concolorous with the pileus. The host is also remarkable: Var. *foliicola* grows mainly on dead leaves of terrestrial Bromeliaceae (Monocotyledones), only rarely, and apparently accidentally, passing over on dicotyledoneous tree leaves. The spore size is entirely within the range of the medium-spored forms of *M. graminum*. Therefore, it will key out also in our key of the *Graminum*-forms. Other South American forms of *M. ruforotula* differ from the type form in lacking the characteristic blackish dot in the center of the pileus; others have broader spores. All have the following characters in common; Pileus from salmon orange to ochraceous-orange or orange-rufous, small: 2—7 mm.; lamellae white to cream, often orange bordered; spores 7.3—10.7 × 3.7—5.3 μ; trama of pileus weakly but visibly amyloid; collarium of lamellae well formed (in var. *foliicola* rarely poorly formed as in some forms of

M. graminum), growing on both monocot and dicot hosts, but not on grasses or bamboo. The following varieties are proposed "at int.".

Key to the forms of *M. ruforotula.*

A. Central blackish dot absent, even in dry material; spores rather broad: 7.5—10.7 × 4—5.3 μ; on small dicot sticks in subxerophytic and subtropical forests in Argentina var. *caecus*

A. Central blackish dot, often also a blackish or bister papilla in the umbilicus present, more distinct in dry material; spores as above, or smaller.

B. Pileus often somewhat salmon („Tokyo" M & P), also „bittersweet orange" (M & P), bleaching in older specimens; lamellae white, only the broadest somewhat orange bordered; on leaves of Bromeliaceae, rarely on fallen dicot leaves, Argentina var. *foliicola*

B. Pileus usually not tending towards orange-salmon, but rather deep orange to orange red, rufous; lamellae usually either cream white to cream color, or strongly orange bordered; on palm sheats, or, more frequently, on wood of dicot trees and shrubs, fallen twigs, etc.

C. Spores relatively broad: 7.3—9.8 × 4—5 μ; pileus „talavera", pl. 11 C 11, 12 B 11 (M & P); Argentina var. *latisporus*

C. Spores relatively not broad: 7.5—9 × 3.7—4.1 μ; pileus reaching „buccaneer" (M & P); Florida var. *ruforotula*

Marasmius marthae Sing. spec nov.

Var. *marthae:*

Pileo atrorubente subpurpureo ("maroon" vel "carbuncle", paene "Piccadilly" M & P), profunde radiatim sulcato, glabro, sicco, convexo, profunde umbilicato, centro interdum purpureonigro sed haud papillato nec maculo nigro in vegetis ornato, sed disco nigrescente in siccis, 4—8 mm lato. — Lamellis candidis, acie atropurpureis, subdistantibus (16—17 lamellis integris), aequalibus, latis, ventricosis, collariatis. — Stipite candido, mox basi nigrescente, maturitate exsiccationeque nigro, glabro, levi, nitente, setiformi, raro basi subincrassato, insititio, 25—35 × 0.2—0.3 mm. — Carne subnulla, pileo sub cute concolori, ceterum alba, haud gelatinosa, inodora. — Sporis (8.3) —14.5—16 × 4(—4.3) μ, hyalinis, tenuitunicatis, levibus, inamyloideis; basidiolis fusiformibus; basidiis tetrasporis, 20—34 × 5.5—7 μ; cystidiis nullis; cheilocystidiis elementis epicuticularibus simillimis; epicute pilei e cellulis hymeniformiter dispositis, breviusculis, saepius forma Clavariellarum carpophora in mentem revocantibus, hyalinis, setulis apicalibus erectis, obtusis, melleis vel melleobrunneis, 2.5—5.5 μ longis obsitis, 13.5—29 × 6.8—17.2 μ efformata; tramate in pileo moderate fortiter amyloideo, in stipite fortiter amyloideo, hyphis fibulatis. — Ad frustula lignea dicotyledonea sub arboribus in horto, Argentina, Tucumán, Jardín del Instituto Lillo, 14-I-1952, Martha Singer, T 1730, LIL.

Var. **paucilamellatus** Sing. var. nov.

Pileo "tanagra", centro "chippendale", dein inter "tanagra" et "mascara" vel "copperleaf" (M & P), centro macula nigra ornato, in siccis interdum nigropapillato, 2.5—10 mm lato. — Lamellis 2.5 mm. latis, 11—13 integris praesentibus, lamellulis nullis. — Stipite griseo, dein umbrino, sicco atroumbrino, 25—38 × 0.2 mm. — Sporis 16—17.3 (21.5) × 3—4 μ; hyphis pilei moderate fortiter amyloideis, stipitis fortiter amyloideis. — Ad radicem *Eugeniae* sp. in silva subtropicali, gregatim, Argentina, Tucumán, Parque Aconquija, Sierra de San Javier, 17-II-1955, R. Singer, T 2179, LIL; ad corticem arboris, Tucumán, 20-II-1955, R. Singer, T 2190, LIL, typus.

The variety differs from the type only in secondary characters such as the degree of differentiation of a central papilla, the number of lamellae, and the shape of the spores (more elongate). This species is very close to *M. sanguirotalis* but differs in more distinctly discolored gill edge (strongly deep purple in both varieties), and the distinctly amyloid trama of the pileus. The latter character also differentiates it from *M. rubromarginatus* Dennis.

Marasmius sanguirotalis Sing. in Singer & Digilio.

The type from Quebrada de Lules, Tucumán, Argentina (LIL) has been partly damaged, and is preserved only in a small fragment; in it, a large number of foreign spores are observed. It is therefore proposed to accept the specimen formerly indicated as para-type as lecto-type. The para-type is in good condition and contains numerous spores. It differs from the former type merely in smaller size (probably caused by subxerophytic habit at the margin of the Selva Tucumano-Boliviana). The spores are 14.6—18.8 × 3.3 μ; the epicuticular broom cells are entirely yellowish melleous to melleous brownish (brownish in the setulae), e. gr. 21.7 × 8—12 μ, setulae obtuse, apical, about 2.7—4.2 μ long; hyphae of the pileus all inamyloid after ammonium hydrolysation and exposure to the Melzer for 2 hours, all with clamp connections. The edge of the lamellae is concolorous with the sides, only near the margin of the pileus remains a trace of purple visible; under a good dissecting microscope, there is some purplish discoloration over some edges, but incomparably less so than in *M. marthae*. This additional character convinces me that *M. marthae* is more clearly different from *M. sanguirotalis* than *M. culmisedus* from *M. graminum*.

Marasmius polycladus Mont.

The type from French Guyana (K) showed the epicuticular broom cells of the same type as those of *M. hippiochaetes* Berk. (drawing see Dennis, Kew Bull. p. 159, fig. 9, 1951), about 22 × 11 μ; spores (5)—7.2 × 3 μ; rhizomorphs relatively thick; all hyphae amyloid. The dark purple color of the epicuticular broom cells is very characteristic

in both *M. edwallianus* Henn. (Fig. 47) from Brazil and the type of *M. hippiochaetes,* but in some portions of the type of *M. polycladus,* I found the setulae more melleous-brownish. Since such forms have also a tendency to be less brightly red, I suspect that two species or two varieties are hiding in the complex *polycladus-hippiochaetes-edwallianus*, aside from the forma *simplex* whose taxonomic importance is nil. It may be that the forma *simplex* is a habitat-form since it usually occurs on fallen leaves or herbaceous stems rather than on larger woody material, tree stumps and fragments, but there

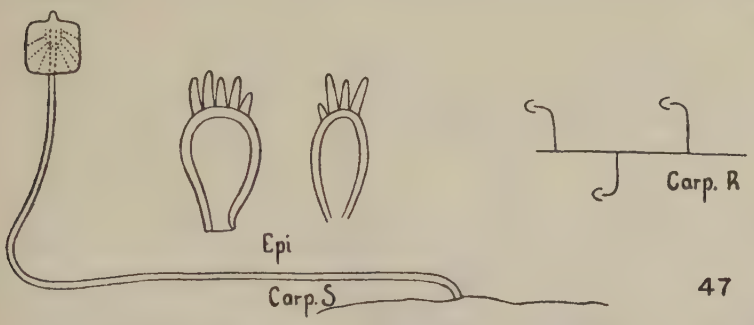

Fig. 47. *M. edwallianus,* specimen from Brazil (Theissen), f. *simplex* (S) and f. *racosa* (R.), S × 10, R, nat. size. Epi, broom cell of the epicutis.

is no correlation between the habitat and growth form on one hand and the color of the pileus on the other. Thus, the type of *M. hippiochaetes* Berk. from the Uaupés River, Amazonas, Brazil, is bright red (coccineus) with entirely red broom cells (K), but has the same habit and habitat as *M. polycladus.* On the other hand, the former has a simple form (insititious directly in leaves) which is non-rhizomorphic but does not differ in any other way from *M. hippiochaetes.* This form was named *M. edwallianus* f. *simplex* Theissen by Theissen (Fig. 47). Whether the two species, *M. polycladus* and *M. hippiochaetes* are specifically different because of a slight difference in the color of the pileus, cannot be decided without further studies in order to find out just how constant this character is.

On the other hand, we discribed a *M. edwallianus* f. *simplex* which differs from that distributed by Theissen in the microscopical color effect produced by the elements of the epicutis, and the broader spores, see Lilloa **25**: 240. 1951 (1952). This species was sterile, and we had no means to decide whether this was a color variation of *M. edwallianus* i. e. *M. hippiochaetes,* or an autonomous species. Recent material proved to be fertile and revealed the fact that the spores are quite different from those of the *M. polycladus* group. Consequently, it is here described as a new species:

Marasmius praecox Sing. spec. nov.

Pileo aurantiorubro, mox pallescente usque ad aurantiorufum (pl. 4 G-H 12, pl. 5 E 12, rarius pl. 4 A 12 "Nasturtium", "Montgomery" vel "mosque", M & P), in siccis ochrorubido ("henna", "Indian red", rarius "caldera" M & P), interdum sed non semper zona pallidiore inter zona lata marginali et maculum fuscom centralem instructo, sulcato, convex, centro umbilicato, in siccis macula fusca in papillam centralem nigram transformata, 1—5 mm. lato. — Lamellis albis, acie pileo concoloribus, latis, haud ventricosis, maturitate distantibus, fortiter collariatis. — Stipite nigro vel umbrino, dein semper nigro,

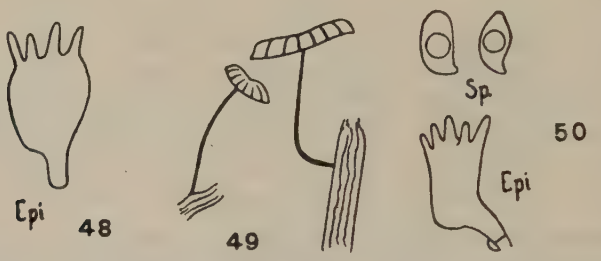

Fig. 48. *M. griseoviolaceus.* Epi, broom cell of the epicutis, × 1000.
Fig. 49. *M. graminum* var. *cynodontis.* Carpophores in natural size.
Fig. 50. *M. graminum* var. *brevisporus.* Sp., spores, × 1000. Epi, broom cell of the epicutis, × 1000.

glabro, setaceo, levi, insititio vel ramificatione rhizomorphae e filamentis nigris rhizomorphocis nato, 12—35 × 0.1—0.2 mm. — Carne admodum exigua, alba vel subnulla in pileo, inodora. — Sporis 7.3—8.7 × 4.7—5.3 μ, hyalinis, inamyloideis, tenuitunicatis, guttula olei centrali plerumque praeditis, ellipsoideis, latiusculis; cystidiis nullis; cheilocystidiis typi „hyphes en brosse" eis epicutis pilei analogis et simillimis; epicute pilei e strato hymeniformi cellularum apice setulis, spinulis erectis vel suberectis obsitarum, paucis saturate aureo-aurantiacarum, plurimis ad apicem flavo-aureis, ad basin pallide aureo-melleis, saturatius coloratarum etiam crassius tunicatarum, gaudentium forma manus humanae vel Clavariellae cuiusdam vel scobiformium, plerumque 17—24 × 6.7—8.5 μ, setulis 2—6.7 μ altis; hyphis flavidis vel subhyalinis, in pileo et in apice stipitis amyloideis. — Ad lignum ramose vel simpliciter at caespitose crescens aut ad ramulos arbustorum spinosorum ad corticem putridam vel ad spinas, nec non (at tunc semper simpliciter) ad stipulas Pteridoptytorum, in siva pluviosa inferiore subtropicali, saepe praecox, Argentina, Tucumán, Yerba Buena et Tafí Viejo, Decembri-Februario, Helberger T 1645 (LIL); S i n g e r T 2033 (LIL, typus); Parque Aconquija, S i n g e r T 2182, LIL.

This species differs from *M. hippiochaetes* in the color of the broom cells and in the relative breadth of the spores; likewise, the diameter of the spores differentiates it from *M. ruforotula* and all similarly colored species. The branched rhizomorphic form is unmistakable.

Marasmius griseoviolaceus Petch (Fig. 48).

The type from Ceylon (K) was analyzed and compared with a specimen under this name collected by Dennis in Trinidad. The two specimens are, in my opinion as well as Dennis's, conspecific. The spores are (5.8)—9.8—10.3 × (3.5)5.3—5.5 μ (in Trinidad; slightly smaller, and also fewer in Petch's type), inamyloid, hyaline, smooth, ellipsoid; cheilocystidia like broom cells of epicutis; broom cells of the epicutis of the pileus hymeniformly arranged and very dark in the Melzer reagent, e. gr. 19 × 9 μ, with erect apical obtuse setulae, projecting 4.5—5.3 μ; hyphae of the trama of the pileus weakly but undoubtedly amyloid.

Material of this, apparently often overlooked but widely distributed species was also collected by the author in Tucumán, Argentina, on bamboo. Here, the spores were intermediate between those of the type and those from the Trinidad collection, viz. 8—9.5 × 4—4.7 μ; basidia 26.7 × 6.7 μ, 4-spored, cheilocystidia like epicuticular broom cells but hyaline; epicuticular broom cells mostly of the *Siccus*-type, some with divergent setulae, setulae always retatively broad and obtuse, not very regularly arranged, and not of the dendrophysoid type, very few epicuticular cells smooth or subsmooth, many hyaline or subhyaline, fewer very deeply colored either only above or entirely, with a strong deep umber-spadiceous membranal pigment; hyphae with clamp connections, strongly amyloid at the apex of the stipe. T 2077 (LIL).

This characteristic species does not appear to be confined to *Bambusa*. Abundant material was likewise collected in Tucumán on various monocotyledoneous hosts (Singer T 2149, LIL). This collection was exactly like that from Trinidad.

Agaricus graminum Lib. (Fig. 49—51).

There is no question about the identification of the type which was distributed as an exsiccatum by Libert. The species offers, in South America considerable difficulties because of a series of forms distinguishable according to spore size — this difficulty we share with the European mycologists where similar spore size differences exist — and, besides, because of forms growing on substrata other than Gramineae. A third and most bothersome difficulty arises from the variable extension of the amyloid reaction of the tissues.

What I would consider the type form — a choice taken because of its common occurrence in Western Europe — is the form with

slowly and partially amyloid (weak reaction) hymenophoral and pileus trama, relatively elongated (15—30 mm.) stipe, medium sized spores (8—10 × 4—5 μ), and growing on grasses (culms, leaf blades, and roots). If there are still spores in Libert's *Agaricus graminum,* this choice may be corroborated.

A particularly large form, up to 14 mm. broad, was found by me on *Cynodon dactylum.* This had 11—14 through-lamellae, but the spores were as above (LE). It is named var. *cynodontis* Sing. in sched.

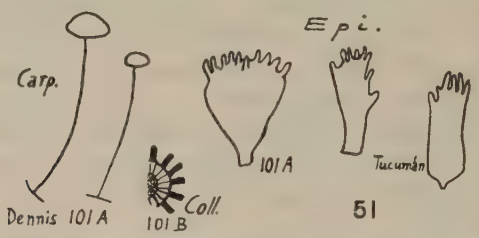

Fig. 51. *M. graminum* forma, type of *M. pruinatus.* Carp., outline of carpophores as preserved at K, nat. size. Coll., attachment of lamellae to stipe with fibrils connecting the collarium with the apex of the stipe, schem., × 7. Epi, broom cells of the epicutis.

The South American forms are smaller, i. e. like the type form in size, or considerably smaller, especially with occasionally very short stipes. I do not know whether this has any meaning taxonomically.

On the basis of negative iodine reaction, we described a new species, *Marasmius culmisedus* Sing. in Sing. & Digilio (Lilloa **25**: 193, 1951). It differs from the type form not only in negative Melzer (in pileus and hymenophore hyphae) but in smaller size (shorter stipe in an average) and slightly larger spores. It grew on *Gramineae.*

A similar form was found on a fallen twig of a Composita or Solanacea (certainly a dicot twig), but here the pileus was smaller and paler than in *M. culmisedus,* the stipe still shorter (4—6 mm.). This is Singer T 1854 which shall be referred to as var. **dicotyledoneus** var. nov. ad int.

Likewise, there is a lignicolous form near the type form, i. e. with the spore size of the type form (8—9.7 × 4—4.2 μ) although the spores may be slightly narrower in an average, short-stemmed (4 mm.) and growing on *Schinus* roots. It has also negative Melzer reaction if applied in the usual way, but after 18 hours a slight and incomplete reaction was observed. When hydrolysation was accomplished with concentrated HCl, a slight positive reaction could be observed already after 5 minutes. Nevertheless, this is probably also the case in all other forms where negative reaction has been indicated in my notes, or has been published. This form is here referred to as var. *schini*

ad int. A foliicolous form (var. *foliicola* ad int.) was also observed in South America.

Dennis has already indicated that a small-spored form exists in Trinidad as well as in Europe, a form he described as var. *brevisporus* Dennis. The type (K) has, according to our measurements, spores 7.3—9(11.5) × 4.5 μ with one round oil droplet. Anatomically, as well as macroscopically, there is no difference from the type form except spore size. It is graminicolous.

The difficulty resulting from differences in carpophore size consists in the variability of a single collection (Singer T 1816) in this regard. Both the size of the pileus and the length of the stipe vary here considerably. It belongs in the character combination named *M. culmisedus*. The complication in the differentiation by the Melzer reaction has been found to be the different reaction observed during identical reaction periods in different tissues. Thus the uppermost part of the stipe, where it has little or no pigment and inserts itself in the collarium, is always distinctly amyloid, in *M. culmisedus* as well as in all other varieties of *M. graminum*. This fact has not been considered during earlier investigations so that the data indicated by me always refer to the trama of the pileus and the hymenophore rather than to the stipe. This may mean that a much larger number of *Rotulae* have partially amyloid stipe than was originally assumed.

Since macroscopical measurements, spore measurements — and these are overlapping — and amyloidity are the only characters applicable when the question of correlation of macromorphological, anatomical and chemical characters is investigated in the various habitat forms, the differentiation of these forms becomes likewise rather precarious. I feel that the intraspecific taxonomy of *M. graminum* sensu lato is not complete or final, and therefore, I refrain from any formal publication of new taxa, while treating the existing ones as varieties, naming the new ones "ad interim".

Key to the varieties of *Marasmius graminum*.

A. Large-spored forms: Spores 8.7—11.8(12.3) × 4—5.3(7) μ, always some spores larger than 10 μ present.
  B. Graminicolous form; size variable; lamellae up to 13; stipe up to 14 mm. long; Argentina, Rio Potrero, Singer T 1816 and type of *M. culmisedus* (l. c.) Var. *culmisedus* n. st,
  B. Lignicolous form on dicotyledoneous hosts; lamellae about 7—8; stipe up to 6 mm. long; Argentina, Rio Potrero, Singer T 1854. Var. *dicotyledoneus*

A. Medium and small spored forms: Spores up to 10 μ long.
  C. Medium-spored forms: Spores 8—10 × 4—5 μ.
    D. Graminicolous forms; stipe about 15—30 mm. long; pileus and hymenophore slightly amyloid.
      E. Pileus up to 14 mm. broad; lamellae 11—14. Europe. (Fig. 49). Var. *cynodontis*

E. Pileus rarely more than 7 mm. broad; lamellae 7—12. Var. *graminum*

D. Foliicolous and lignicolous forms; stipe up to 15 mm. long; pileus and hymenophore slightly amyloid or practically inamyloid.

F. Foliicolous form; stipe 5—14 mm. long; pileus 4—6 mm. broad; lamellae 10—13; hyphae of pileus and hymenophore weakly but visibly amyloid; on dead leaves of Bromeliaceae and on fallen leaves of trees, shrubs, etc.; pileus rather deep colored (e. gr. „bittersweet O." M & P); Argentina, Tucumán, Singer T 2147. (See *M. ruforotula* var. *foliicola*)

F. Lignicolous form on dicotyledonous hosts; stipe rarely longer than 5 mm.; pileus rarely broader than 5 mm.; lamellae fewer than 13; hyphae of pileus and hymenophore after NH_4OH hydrolyzation and 5 minutes of action with the Melzer still hyaline or yellowish hyaline; Argentina, Suncho (Catamarca), Singer T 1788, on *Schinus*. Var. *schini*

C. Small spored form on Gramineae; spores 7.3—9 × 4.5 µ. Trinidad (Dennis). (Fig. 50) Var. *brevisporus*

The type variety has not yet been found in Southern South America. It is, however, rather common further north.

Marasmius pruinatus Berk. & Curt. from New England, coll. Sprague (K) was found to be a form of *M. graminum,* most probably var. *graminum,* but spores were not recovered. The hymenophoral trama is weakly amyloid. The collarium is definitely present although not fully free and easy to overlook. The stipe is insititious and grows on grass. Fig. 51.

Species not analyzed or not preserved.

M. amazonicus Henn. Type destroyed.

M. ardosiacus Mont. from Bolivia, not analyzed, type not found.

M. auriformis Henn. from Brazil, type destroyed, possibly not a *Marasmius.*

M. bonaerensis Speg. from Argentina. Type insufficient.

M. brachypus Speg. from Argentina. Type insufficient.

M. bruchianus Speg. from Argentina. Type insufficient.

M. cantharelloides Henn. from Brazil. Type destroyed.

M. clitocybeformis Henn. from Brazil. Type destroyed.

M. cyperinus Speg. from Argentina. Type insufficient.

M. fulvus Mont. in Sacc., a nomen confusum, see Dennis, l. c. p. 157.

M. hypophaeus Berk. & Curt. Type not studied. From Cuba.

M. musicola Murr. from Cuba. I have not studied the type which, according to its original description and the notes published by Dennis (l. c. p. 202, fig. 13) might belong to the sect. *Hygrometrici,* provided that the stipe is really insititious and the trama inamyloid.

M. ochraceopapillatus Henn. from Brazil, Type destroyed, probably not a *Marasmius.*

M. personatus Berk. & Curt. is obviously a representative of section *Sicci*, but with both pileus color and spore measurements unknown, it must, at least temporarily, be excluded as a nomen dubium. Cf. Dennis, l. c. p. 160.

M. putredinis Berk. & Curt. from Cuba. Type not seen; may not be a *Marasmius*.

M. rubricosus Mont. I have not seen the type from French Guyana. Dennis (l. c., p. 158) thinks it might be an earlier name for *M. hinnuleus* Berk. & Curt.

M. sphaeroderma Speg. from Argentina. Type lost; authentic specimen insufficient. According to description perhaps close to *M. crescentiae* Murr. Nom. dub.

M. weddelianus Mont. from Brazil. Type not seen.

All other species, indicated from South or Central America, and not mentioned here, or in the general text, do not belong in the genus *Marasmius* as delimited here.

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Über eine neue Puccinia-Art der australischen Flora, Puccinia Pryorii n. spec.

Von F. Petrak (Wien).
Mit 1 Textabbildung.

Puccinia Pryorii Petr. n. spec.

Pycnidia in foliis plus minusve hypertrophice deformatis et expallescentibus denique flavido-viridulis evoluta, plerumque hypo- raro etiam epiphylla, laxe vel subdense dispersa, solitaria vel saepe bina complurave aggregata et connata, sub epidermide evoluta, subglobosa vel late ellipsoidea, 80—120 μ diam., clausa, postea late aperta; teleutosori plerumque hypo- rarissime epiphylli, dense dispersi vel gregarii, saepe bini compluresve aggregati, tunc plus minusve connati et confluentes, ambitu orbiculares vel elliptici, saepe plus minusve irregulares, ca. 200—500 μ diam. vel plus minusve elongati, tunc usque ad 1.5 mm longi, subepidermales, mox erumpentes, obscure castaneo- vel atrobrunnei, subpulverulenti; teleutosporae quoad formam et magnitudinem variabilissimae, oblongae, plus minusve clavatae, anguste ellipsoideae, oblongo-ovoideae vel piriformes, plus minusve irregulares, vel obliquae raro rectae, antice late rotundatae, postice plus minusve, saepe valde attenuatae, circa vel paulo supra medium septatae, plus minusve, plerumque valde contractae, castaneo-brunneae, 30—43 μ, raro usque ad 50 μ longae, 14—21 μ latae, episporio 1.5—2 μ crasso, levi, in apice usque ad 3—6 μ plerumque oblique incrassato, pedicello hyalino, tenuiter tunicato, 25—35 μ raro usque ad 45 μ longo, 3.5—5 μ crasso subpersistente sed fragilissimo.

Auf lebenden Blättern und Blattstielen von *Oreomyrrhis ciliata.* Australien; NSW. Brindabella, 18. XII. 1957, leg. L. D. Pryor, comm. E. Gauba.

Auf dem mir vorliegenden, zahlreichen Material sind auf den jüngeren Blättern und dem obersten Teile ihrer Stiele nur mehr oder weniger zahlreiche, blass gelbbräunliche oder honiggelbe, rundliche, subepidermal dem Mesophyll eingesenkte Pykniden vorhanden, deren hyaline, nur in dickeren Schichten hell gelblich gefärbte Wand aus rundlich eckigen, relativ dickwandigen, 2.5—3.5 μ grossen Zellen besteht. Äzidien wurden nicht gefunden. Später erscheinen die bald nur locker, bald mehr oder weniger dicht zerstreuten, dann oft gehäuften und zusammenfliessenden dunkel kastanien- oder schwarzbraunen Teleutosori, die zuweilen kleinere Fiederabschnitte der Blätter vollständig überziehen. Sie sind mit einer unten schwach kon-

vexen, relativ scharf begrenzten, oben mehr oder weniger flachen, ca. 100—140 μ dicken Basalschicht subepidermal dem Mesophyll vollständig und tief eingewachsen und werden durch Abwerfen der Epidermis bald frei. Diese Basalschicht besteht der Hauptsache nach aus einem pseudoparenchymatischen, meist intra-, teilweise auch interzellulär sich entwickelnden Gewebe, das die Zellen der Matrix zwar mehr oder weniger zusammendrückt, beziehungsweise ausfüllt, sonst aber ziemlich unverändert lässt und aus rundlich eckigen, etwas dickwandigen, hyalinen, 3—6 μ, selten bis 10 μ grossen Zellen besteht.

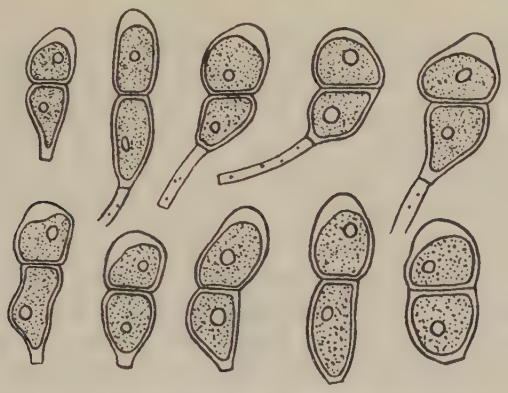

Fig. 1. Teleutosporen von *Puccinia Pryorii* Petr. n. spec. Vergr. ca. 500. Zeichnung von H. Petrak.

Unten und an den Seiten löst sich dieses Gewebe in zahlreiche, äusserst zartwandige, spärliche, sehr feinkörnige Plasmareste enthaltende, 1.5—2.5 μ dicke Hyphen auf.

Der Pilz ist durch die grosse Variabilität der Teleutosporen sehr ausgezeichnet und leicht kenntlich. Wie aus der oben mitgeteilten Beschreibung und der beigefügten Abbildung hervorgeht, sind die meisten Teleutosporen mehr oder weniger, oft sehr unregelmässig und mit sehr deutlich, oft schief verdicktem Epispor versehen. Die relativ kurzen, ziemlich dauerhaften, aber leicht abbrechenden Stiele sind meist 20—35 μ, vereinzelt bis 45 μ lang und an den frei gewordenen Sporen nur noch vereinzelt vorhanden. Der Keimporus der oberen Zelle befindet sich meist in der oberen Hälfte, zuweilen am Scheitel, sehr selten auch etwas unterhalb der Mitte, der Keimporus der Unterzelle meist auch oberhalb, selten etwas unterhalb ihrer Mitte.

Auf *Oreomyrrhis andicola* wurden bereits zwei *Puccinia*-Arten beschrieben, nämlich *P. ruizensis* Mayor in Mém. Soc. Neuchât. Sci. Nat. V. p. 486 (1913), die in Südamerika und *P. oreomyrrhidis* G. H. Cunn. in Trans. New Zealand Inst. LV. p. 669, Fig. 49 (1923), die in Australien und auf Neu Seeland gefunden wurde.

Mayor's Pilz soll nach Beschreibung und Abbildung längliche, 28—38 ⇌ 18—21 μ grosse, gelbbraune, beidendig breit abgerundete, mit ca. 2 μ dickem, am Scheitel nicht verdicktem Epispor und kurzen, bis 20 μ langen, hinfälligen Stielen versehene Teleutosporen haben, deren Teilzellen fast die gleiche Form und Grösse haben. Die zahlreichen, vom Autor abgebildeten Sporen sind alle mehr oder weniger regelmässig, kaum etwas ungleichseitig oder schief und niemals gebogen.

Von *P. oreomyrrhidis* G. H. Cunn. sollen die Sporen nach den Angaben der Autors ellipsoidisch, selten etwas keulig und 31—45 ⇌ 12—20 μ gross sein; am abgerundeten Scheitel soll das 1.5—2 μ dicke, sehr klein, aber deutlich punktierte Epispor auf ca. 3—3.5 μ verdickt, die untere Zelle etwas länger und schmäler sein als die obere.

Wie man sieht, stimmt Cunningham's Art sowohl mit *P. ruizensis* als auch mit dem von mir hier beschriebenen Pilz in mancher Beziehung gut überein. Von Mayor's Art wäre *P. osmorrhizae* nur durch etwas grössere, am Scheitel schwach verdickte, mit feinkörnig rauhem Epispor versehene, kastanienbraune Sporen verschieden.

Dass *P. Pryorii* der *P. osmorrhizae* nahe steht, kann keinem Zweifel unterliegen. Ich war zuerst auch geneigt, die beiden Pilze für Formen einer einzigen Art zu halten. Die Untersuchung zahlreicher Sporen aus vielen, verschiedenen Teleutolagern zeigte mir aber, dass sich der von Pryor gesammelte Pilz durch mehrere, leicht erkennbare Merkmale von *P. osmorrhizae* unterscheiden lässt. Cunningham bildet von seiner Art vier Sporen ab, die zwar in bezug auf ihre Grösse wesentlich, in ihrer Form jedoch kaum voneinander verschieden sind. Desto auffälliger ist die grosse Veränderlichkeit der Sporenform von *P. Pryorii,* was auf der hier beigefügten Abbildung deutlich zu erkennen ist. Viele von ihnen sind mehr oder weniger schief, an der Querwand fast „geknickt", die Unterzelle ist zuweilen etwas gekrümmt und in bezug auf die Form von der Oberzelle mehr oder weniger, oft ganz verschieden. Das stets ganz glatte, nie fein punktiert rauhe Epispor ist am Scheitel meist wesentlich stärker und oft schief verdickt. Die leicht abfallenden Stiele habe ich nie über 45 μ lang gefunden.

Diese, gewiss sehr auffälligen, auf dem mir vorliegenden Material sehr konstanten Merkmale rechtfertigen wohl die Ansicht, dass *P. Pryorii* als eine von *P. osmorrhizae* hinreichend verschiedene Art aufgefasst werden muss.

Synchytrium vaccinii*).

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With 10 textfigures.

Synchytrium vaccinii is a parasite of *Vaccinium macrocarpon* and other species of the *Ericaceae* and causes the so-called red rust or red gall disease of the cranberry. According to Halstead (1889), it was collected first by Smith, entomologist of the New Jersey Experiment Station, in 1886 in the Marian Cranberry Bog near Browns Mills, Burlington County, N. J. In July, 1887, Brakely sent some of the diseased plants to the Division of Entomology, U.S.D.A., where the galls were identified as those caused by a gall mite of the genus *Phytoptus*. However, in March, 1889, Thomas identified the etiologic agent as a species of *Synchytrium* which he named *S. vaccinii* without giving a diagnosis of it. Halstead (1889) visited the Marian Bog on several occasions and determined the abundance and distribution of the disease. He gave a lengthy discussion of the disease, reported its occurrence on other ericaceous species such a *Azalea viscosa, Chamaedaphne* (*Cassandra*) *calyculata, Clethra alnifolia, Gaultheria procumbens, Gaylusscia* sp., and *Kalmia angustifolia,* and described and figured the variations in the structure of the galls on different hosts. In the following years (1890, '91) he devoted considerable time to a study of the disease and means of controlling it. Subsequently, *Synchytrium vaccinii* was reported on *V. macrocarpon* in Michigan by Kaufman (1928) and in Nova Scotia by Conners (1933, '36, '37, '38, '39 and '48). Conners reported it on *Andomeda glaucophylla, Chamaedaphne baccata, Ledum groenlandicum,* and *Rhodora canadense* in addition to the hosts noted above.

However, according to hebarium specimens in the National Collections at Beltsville, Md., the herbarium of the University of Wisconsin, and elsewhere, *S. vaccinii* has been collected in several other localities: on *V. macrocarpon,* May's Landing, N. J. and on *Ledum*

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I am very grateful to Dr. Charles A. Doehlert, Research Specialist, Phillip Marucci, Entomologist, and Harry Moulter of the Cramberry and Blueberry Research Laboratory, Pemberton, N. J. for unstinted assistance in finding and collecting *S. vaccinii* and for use of field and laboratory facilities.

sp. and *V. macrocarpon* at Kingman, Me. (C. L. Shear and N. E. Stevens, 8-23-1917 and 9-26-1917, resp.); on *V. macrocarpon* at an unidentified locality in Massachusetts (H. J. Franklin, 9-3-1912); on *V. macrocarpon* at Bournedate, Mass. (A. C. Goheen, 6-16-1954) and on *V. macrocarpon* at Medford, N. J. (C. Varney, 6-4-1956). In this connection it may be noted that the specimen labeled *S. vaccinii* on *Vaccinum canadense* collected by an unknown person near Bozeman, Mont. is a rust. Also, the specimens on *Gaultheria procumbens* collected by R. Thaxter, Apr. 1921 at Kittery, Me. is not *S. vaccinii,* but may prove to be *S. aureum.*

Thomas described the thallus of the fungus as a resting spore which germinates in the spring and produces infective zoospores, altough he did not observe the manner of spore germination. Halstead also implied that the thallus is a resting spore but he referred to it frequently as a sporangium. Probably, as a consequence other students of the disease, including Shear (1907), Schwarze (1917), Shear, Stevens and Bain (1931) continued to describe the thallus as a sporangium. Tobler (1912), on the other hand, followed Thomas' description and interpreted it as a resting sorus or spore. Accordingly, from these conflicting descriptions it is impossible to tell whether *S. vaccinii* is long-cycled and develops sori, sporangia, zoospores and resting spores, or short-cycled and forms only resting spores and zoospores. Obviously, if it forms only resting spores which germinate as sporangia it is not a species of *Synchytrium.* Therefore, it is essential that *S. vaccinii* be studied carefully and fully before its relationships and proper classification can be determined.

In an attempt to solve these problems I made a search for *S. vaccinii* in June, 1956, at Browns Mills, N. J. where it was collected originally. No evidence of it was found there, but Dr. Charles A. Doehlert, Research Specialist of the Cranberry and Blueberry Research Laboratory at Pemberton, N. J. informed me that it had been found recently in another area. Under his direction a search in the Gardner Brother's bog of the Woolman Tract two miles south of Indian Mills, N. J. on U. S. Route 206 revealed an abundance of the fungus. Almost all cranberry plants in an area of approximately half an acre were heavily infected, and among these were *Chamaedaphne (Cassandra) calyculata* and numerous seedlings of *Acer rubrum* which were infected also. Infected leaves and petioles of these hosts were fixed in killing solutions in the field, and an abundance of herbarium material was collected. At the same time pieces of sod, 12" × 18", with heavily infected cranberry plants were dug up and transferred to the greenhouse at Purdue University for the purpose of observing the progress of the disease and development of the parasite. This sod has been maintained successfully under bog con-

ditions for more than a year, and the cranberry vines have spread considerably.

The same site in New Jersey was carefully examined again in June, 1957, and only a very few cranberry vines were found to be infected. Apparently, the degree of infection varies from year to year and may even disappear entirely in a specific locality. At least, this is suggested by G o h e e n's (1950) report that no evidence of the red gall disease could be found in the type location of *S. vaccinii,* at Brown Mills Junction, N. J. I searched this location also in 1957 without finding any diseased plants.

A morphological, cytological and developmental study of the parasite on the three hosts listed above has shown that *S. vaccinii* is a valid short-cycled species of *Synchytrium* which develops only resting spores in the so-called summer phase. The present contribution gives the results of this study and concerns the reaction of the host to infection, development and characteristics of the galls produced, and the developmental cycle of the parasitic so far as it is known.

As previous workers have described, *Synchytrium vaccinii* infects the epidermal cells of the leaves, young stems, petioles, flowers and fruits of the cranberry, and if these organs are heavily parasitized when young they become stunted and abort. The galls which result from the infection are brilliantly raspberry- or lavender-red, large in size, and have a characteristic shape so that their presence can be detected readily with the unaided eye. They are largely superficial on the host and somewhat chalice-like in shape, as Thomas pointed out. However, the basal portion is usually inflated instead of stalked as in a typical chalice, but occasionally it is constricted beneath the inflated region so that the galls appear to be stalked. The apical portion may be as tall as or taller than the base and consists of an outwardly-flared rosette of greatly elongate thin-walled cells (fig. 1). Accordingly, when viewed from above the rosette resembles a cup with a brillantly yellow spore in its bottom. Longitudinal sections of galls, however, show that the spore and host cell usually lie in the upper part of the gall base so that the infected cell is partially exposed, as shown in fig. 1. The gall shown in this figure is almost symmetrical with a slight basal constriction, but other galls may vary markedly in this respect. The basal portion may be mound-like or almost hemispherical without a constriction and sits directly on the surface of the host. In such cases the entire gall may be almost cylindrical in shape if the rosette does not flare-out markedly. Also, the height and degree of flaring of the apical rosette may vary markedly on *V. macrocarpon*, and as a result the galls may be quite variable in shape and size. H a l s t e a d (1889), also, noted that although the galls on the other ericaceous hosts may vary considerably,

they, nevertheless, have the same basic structure. On *Clethra alnifolia,* however, he found them to be much larger than those on other hosts and covered with numerous hyaline hairs.

As noted previously, the galls are comparatively large and may be 494 to 720 μ broad at the base by 520—830 μ high on leaves of the cranberry vines. The sheath at the sides of the infected cell varies from 2—5 cells in thickness, and the walls of its cells are not markedly thickened. Most of these cells are filled with a densely-stained material which may be continuous, reticulate or globular, so that the galls in stained sections have a dark and chromatic appearance. This material occurs abundantly in cells of healthy leaves also, and its occurrence is not due to the presence of the parasite. Accordingly, the material has been omitted from the cells shown in figs. 1—5. The surface of the cranberry leaf immediately opposite the gall may bulge out fairly often (fig. 1), and this appears to be due to division and outward elongation of the palisade or mesophyll cells or cells derived from them.

These galls are the result of the reaction of the host to the presence of the parasite, and their development involves cell enlargement and cell division. After the parasite enters an epidermal cell the latter begins to enlarge and protrudes slightly above the surface of the leaf. Within a short time the adjacent healthy epidermal, mesophyll or palisade cells are stimulated to divide, and thus form the rudiments of the sheath. As a result the enlarging and protruding host cell becomes enveloped partially by meristematic healthy cells with its outer surface exposed, and the incipient gall emerges as a low mound-shaped protuberance wih the large infected cell at its center. The cells derived from epidermis, palisade or mesophyll continue to divide and enlarge, so that the incipient sheath keeps pace with the enlargement of the host cell. The healthy cells immediately beneath the latter, however, appear to proliferate more rapidly so that the host cell is carried outward and eventually occupies the upper portion of the developing gall. Usually part of its surface is naked and exposed at the apex (fig. 2). At the stage shown in this figure development of the basal portion of the gall may be described as being complete, and this portion now protrudes conspicuously and may be almost hemispherical or highly mound-shaped. Subsequent growth results in the development of the cup-shaped apical rosette, which occurs fairly rapidly. The rosette originates from the outer or epidermal and inner sheath cells which begin to elongate upward and divide around the upper portion of the infected cell. The outer or epidermal sheath cells also may be involved in this process, but most of the rosette appears to originate from the inner apical sheath cells. These cells elongate and inflate fairly rapidly and seem to burst out of the apex of the gall, and in some cases the outer epidermal

layer may be pushed outward sligthly (fig. 4). An early stage of rosette development is shown in fig. 3, and here the outer cells have divided and been lifted up by the proliferating cells beneath. Figure 4 shows a later stage in which the inner sheath cells have elongated further, divided and become inflated at their apices. Also, they have begun to flare outward to produce the characteristic appearance of the rosette. These cells may divide after this stage, but the further development of the rosette appears to be due primarily to cell elongation. In tall mature galls such as shown in Fig. 1, some of the rosette cells may be up to 416 μ long. In the living condition they are comparatively thin-walled and distended with a lavender-red sap, but in fixed and stained sections they are filled with the densely-stainable substance noted previously. As the galls attain maturity and dry out, the rosette usually collapses inward on two sides and thus partially closes up the conical opening or crater to the infected cell. The two collapsed sides of the rosette look like lips with a narrow slit between.

As noted earlier *S. vaccinii* has been reported only on species of the family Ericaceae, and for this reason mycologists have regarded it as being limited to one family of hosts. In the Gardner Bog, however, it was found on numerous one- and two- and a few three-year old seedlings of *Acer rubrum,* a host far-removed from the *Ericaceae* in most systems of classification. Numerous galls in various stages of development and abortion were present on the stems, petioles and lower leaves, and these had the same raspberry or lavender-red color characteristic of galls on *V. macrocarpon.* Examination of the stems of 3-year old seedlings showed areas where they had been infected in previous years. Scars and remnants of aborted galls were present in such areas and looked like those illustrated by Halstead (1889) on the older portions of stems of *V. macrocarpon.* Several of the young maple leaves were heavily infected, wrinkled, curled and stunted in growth. A cytological study of such leaves showed that *A. rubrum* is susceptible to infection but resistant to the development and maturation of the parasite. As a result very few, if any, mature and viable resting spores are formed on this host. Galls of various sizes, shapes and degrees of complexity develop from infections, but the thallus of the parasite aborts, dies, and may be eliminated from the host before it reaches maturity.

Although infection has not been observed in *A. rubrum* the zoospores apparently infect the epidermal cells of young leaves and petioles as they emerge in the spring. Such cells as well as adjacent healthy ones react in the same manner as described for *V. macrocarpon* and form the rudiments of the gall. This is illustrated in fig. 5 which shows the enlargement of the infected cell and recent division of the adjacent epidermal, mesophyll and palisade cells. Even at this

early stage the cytoplasm and nucleus of the host cell appear to be clumped, necrotic and degenerating around the parasite, and probably as a result the latter is deprived of nourishment and may not develop much beyond this stage. In such instances abortion seems to be necrotic and acute, and further host reactions may be limited to the discharge of the infected cell and fungus from the host. So far as is known at present, acute necrotic abortion seems to be comparatively rare, and in most cases studied abortion was chronic with fairly extensive host reaction and gall development. Such galls may develop to a height and breadth of 200 and 250 μ, respectively, and in some instances become almost as large and complex as those on *V. macrocarpon*. A young gall illustrating early stages of chronic abortion is shown in fig. 6. The infected cell lies in the apex, but is not fully enveloped by the sheath. The outer sheath of epidermal cells is fairly well developed but its cells are not much larger than normal ones. Apparently, this layer keeps pace with the outward enlargement of the gall by frequent division of its cell, as is suggested in fig. 8. The inner sheath cells, on the other hand, begin to enlarge and elongate outward, and this is the first indication of the mechanism by which the infected cell and parasite are eventually eliminated or discharged from the host. This elongation apparently carries the infected cell outward so that it occupies an apical position in the gall. In this figure also the host cell protoplasm appears clumped and necrotic, but the parasite seems to be normal in appearance except for the irregular nucleus.

A larger gall on *A. rubrum* is shown in fig. 7 in which the cells under the infected one have divided several times and enlarged to form a meristematic mass of cells. Here also the cells immediately beneath the host cell have elongated outward and invaginated its lower surface. The parasite fills the host cell completely and its nucleus and cytoplasm appear abnormal and necrotic. In other galls studied the elongation of the inner sheath cells was very pronounced as shown in fig. 8. In this gall the outward growth of these cells has caused the infected cell to collapse, and reduced it to a lunate cavity in the apex of the gall. The parasite also has collapsed and appears to be dead. Eventually, the host cell and parasite may degenerate intact, or the cell may rupture and release the content of the fungus as shown in fig. 9. Whichever happens, a brown scar or necrotic area remains at the tip of the gall which heals spontaneously. As noted earlier, gall development may proceed even further to the formation of the apical rosette, and in such instances the galls may look somewhat like those of *V. macrocarpon*. This occurs fairly frequently, but few of the galls are symmetrical. The rosette may develop partly or completely on one side and be lacking on another so that the galls are irregular in shape. Fig. 10 shows the upper portion of a gall whose

upper part has proliferated to form an abortive rosette. The shriveled infected cell and its degenerated parasite have been carried upward and lie at the apex of the elongate cells. In other galls they may lie at one side of the rosette. Some large galls may contain spores, but these are small, usually hyaline and aborted. In all galls studied so far no mature and normal spores were found, but it is not improbable that such spores may be formed occasionally. It should be noted here that the infected cell, parasite and gall may abort occasionally on *V. macrocarpon* also.

Conners (1939) reported that specimens of *Synchytrium* on *Rubus hispidus, Amelanchier,* sp., *Ilex* sp., and *Spirea* sp. were collected in the same bog with *S. vaccinii,* and in a note accompanying the specimens Dr. Groves stated that they might be *S. aureum* instead of *S. vaccinii.* My discovery that the latter species will infect *Acer rubrum* suggested that these specimens might be *S. vaccinii* also, and through the generous loan of material by Drs. I. L. Conners and D. B. O. Savile I had the opportunity of studying them. This study showed that they are all *S. vaccinii.* Most of the galls were aborted in varying degrees, but in general they were more extensively developed than those on *Acer rubrum.* A few of them had a well-developed and flared rosette at the apex, and resembled very closely those on *Vaccinium macrocarpon.* Also, most of them contained small hyaline to light-yellow resting spores which were aborted in varying degrees, and I doubt that any of them were viable. At least, all attempts to germinate them failed.

This study has swohn thus that *S. vaccinii* is not limited in host range to species of the *Ericales* and that it may infect members of the *Aceraceae, Rosaceae, Aquifoliaceae,* and *Primulaceae* as well. Quite likely, many other hosts will be found to be susceptible to infection when extensive host range studies are made. So far as is known, however, all hosts besides species of the *Ericaceae* appear to be resistant to the development of the parasite, although they are readily susceptible to infection.

The reactions of *A. rubrum* and the other non-ericaceous hosts noted above are similar in many respects to those described by Kusano (1929), Köhler (1927, 1931), Karling (1954), Sinski (1956), and Hartmann (1958) for other resistant or immune hosts which are parasitized by *Synchytrium* species. However, acute or almost immediate necrotic abortion of the parasite and host cell does not occur very often on *A. rubrum* so far as is known at present. Instead, abortion is commonly chronic. The parasite usually develops to considerable size before degeneration begins and this is accompanie by slight to extensive gall development. Eventually, the host cell and parasite are eliminated or discharged primarily by elongation of the inner sheath cells. So far no necrosis of the sheath cells such

as occurs in resistant potato varieties has been observed. In the potato variety, Prussian, infected by *S. endobioticum,* for instance, Köhler noted that the adjacent cells become necrotic and filled with gummy degeneration products. These eventually die and thus cut off the food supply of the infected cell and parasite. In *A. rubrum* also many of the sheath cells are filled with a dense, deeply stainable substance (fig. 5—9), but its presence apparently is not due to infection by *S. vaccinii.* Such material occurs commonly in fixed and stained sections of healthy uninfected leaves of *A. rubrum.*

As noted earlier, *S. vaccinii* is a short-cycled species and develops only resting spores in the so-called summer phase. These spores develop in the same manner as those of other species of the subgenus *Pycnochytrium* so that the process need not be described in detail. After the parasite enters the epidermal cell it increases in size as the host cell enlarges and finally becomes a typical resting spore. At maturity it almost fills the host cell completely (fig. 1—6) and is enveloped by a sparse or fairly abundant amount of reddish-brown residue. Its wall is smooth, light-amber, comparatively thin, and its content is brilliantly chrome- to lemon-yellow.

In cranberry bogs the infected leaves and their galls fall to the ground in the late summer, fall and winter, and the spores apparently germinate within the disintegrating galls during the spring months. The custom of flooding the bogs in the winter to prevent desiccation of the cranberry vines and the subsequent freezing over appear to be conducive to maturation of the spores and their germination in the spring. Certainly, flooding the bogs creates ideal conditions for zoospore dissemination and quite probably almost countless zoospores are present in the water as the new leaves of the host emerge in the spring. In Nova Scotia Conners (1939) reported that infection of the unopened terminal buds of *V. macrocarpon* takes place prior to or on May 23. However, when a bog was reflooded for 48 hours on July 5 and 6, infection was evident on July 15, ten days later. This suggests that the resting spores may germinate at any time in nature when temperature and moisture conditions are favorable.

However, it is not certain what are favorable conditions for germination. During the past three years all attempts to germinate the spores outdoors and in the laboratory at Purdue have failed. Mature spores were dissected out of the galls onto wet filter paper, flooded with charcoal-treated water in petri dishes, and kept in a refrigerator for several weeks to simulate winter temperature conditions in cranberry bogs. These were thawed out in the laboratory and observed for several months, after which the same treatment was repeated twice. Also, spores in petri dishes were kept outdoors over the winter during which time they were subject to freezing and thawing.

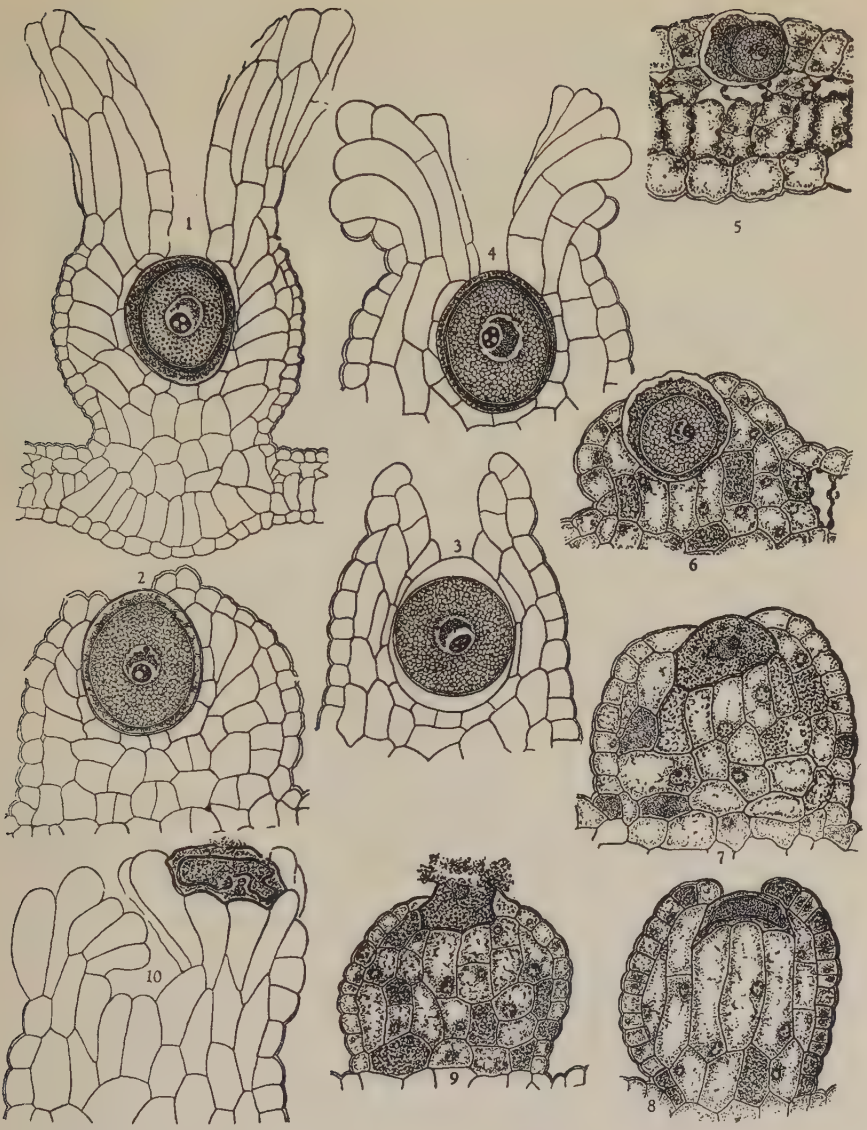

Fig. 1—10. *Synchytrium vaccinii.* Fig. 1. Longitudinal section of mature gall on *V. macrocarpon.* X124. Fig. 2. Young gall before development of apical rosette. X124. Fig. 3, 4. Stages in development of apical portion of gall. X124. Figs. 5, 6. Stages in abortive gall development and abortion of infected cell and parasite on *Acer rubrum* X140. Fig. 7, 8. Expulsion of infected cell and parasite by elongation of central sheath cells of *Acer rubrum.* X140. Fig. 9. Rupture of infected cell and parasite at apex of abortive gall on *Acer rubrum.* X120. Fig. 10. Remnants of infected cell and parasite at tip of apical rosette on *Acer rubrum.* X140.

Accordingly, the life cycle of *S. vaccinii* is not fully known, and it is impossible to classify it accurately at the present time. However, it is placed tentatively in the subgenus *Pycnochytrium,* pending discovery of the method by which the resting spores germinate.

Summary.

Synchytrium vaccinii is a short-cycled, compositely monogallic species which develops only resting spores and causes a red gall disease of the cranberry. On ericaceous hosts it stimulates the development of unusually large, reddish-lavender, composite, chalice-like galls with a flared apical rosette of elongate cells. It has been found to parasitize species of the families *Aceraceae, Rosaceae, Aquifoliaceae* and *Primulaceae* also, which were growing in infected cranberry bogs. Such species are susceptible to infection but unfavorable to normal development of the parasite. On such hosts most of the galls and parasite abort to varying degrees, and the parasite is frequently eliminated or discharged from the host. The abortion is commonly necrotic and chronic and rarely acute.

Resting spore germination has not been observed in *S. vaccinii,* but it is placed tentatively in the subgenus *Pycnochytrium.*

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Pilze aus dem Himalaya II.

Von Emil Müller.

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Mit 8 Textabbildungen.

In einer ersten Arbeit (Müller, 1957) habe ich eine Anzahl Ascomyceten, welche im Sommer 1957 anlässlich meiner Reise in den Himalaya gesammelt worden sind, als neu beschrieben. In dieser zweiten Arbeit soll dieses Unternehmen fortgesetzt werden, wobei wiederum einige bemerkenswerte Arten teils als Neubeschreibungen, teils als Neufunde für das in Frage stehende Gebiet besprochen werden sollen.

11. *Acantharia sinensis* (Petr.) v. Arx.

Als *Neogibbera sinensis* beschrieb Petrak (1947a) einen in China auf lebenden Blättern von *Quercus semicarpifolia* Sm. parasitierenden, charakteristische Blattflecke hervorrufenden Ascomyceten. Nun hat von Arx (1954) aber nachgewiesen, dass die Gattung *Neogibbera* Petr. mit *Acantharia* Theiss. et Syd. zusammenfällt, und er nennt diesen Pilz dementsprechend *Acantharia sinensis* (Petr.) v. Arx.

Auf Material von *Castaneopsis indica* A.DC. fand ich einen in den wesentlichen Partien übereinstimmenden Pilz, welcher sich nur durch den Mangel an längern Stromaborsten von *Acantharia sinensis* unterscheidet und von diesem kaum spezifisch verschieden sein dürfte. Es ist zwar auffallend, dass ganz in der Nähe vorkommende Bäume von *Quercus semicarpifolia* Sm. nicht befallen waren; wir wissen aber so wenig über die Biologie dieser Pilze, dass diese Tatsache auch auf ökologische Faktoren zurückgeführt werden könnte.

Der Pilz bildet auf den befallenen Blättern auffallende, fast schwarze, unregelmässig rundliche, oft buchtige Flecke von oft erheblicher Ausdehnung. Zuweilen sind die Blätter übersät von kleinen Flecken von 1—2 mm Durchmesser, zuweilen fliessen erheblich grössere Flecke ineinander und bilden fast die gesamte Blattfläche einnehmende kranke Flächen, welche durch die dicht nebeneinander stehenden Stromata tiefschwarz erscheinen. Innerhalb der Flecke ist das Blattgewebe bräunlich verfärbt und die Flecke sind durch einen kaum wahrnehmbaren Saum von der grünen Blattfläche abgegrenzt.

Im Innern des Blattes findet sich streng subkutikulär eine aus senkrechten Reihen von 8—12 μ grossen, ziemlich derbwandigen, hyalinen oder unter den oberflächlichen Partien des Pilzes dunkelbraun gefärbten, prismatischen Zellen bestehende Hypostromaschicht. Stellenweise bricht diese durch die Kutikula und erweitert sich oberflächlich zu kissenförmigen, im Umriss mehr oder weniger rundlichen, oben meist deutlich gewölbten, seltener breit abgeflachten Stromata von 250—350 μ Durchmesser. Diese bestehen aus divergierenden Rei-

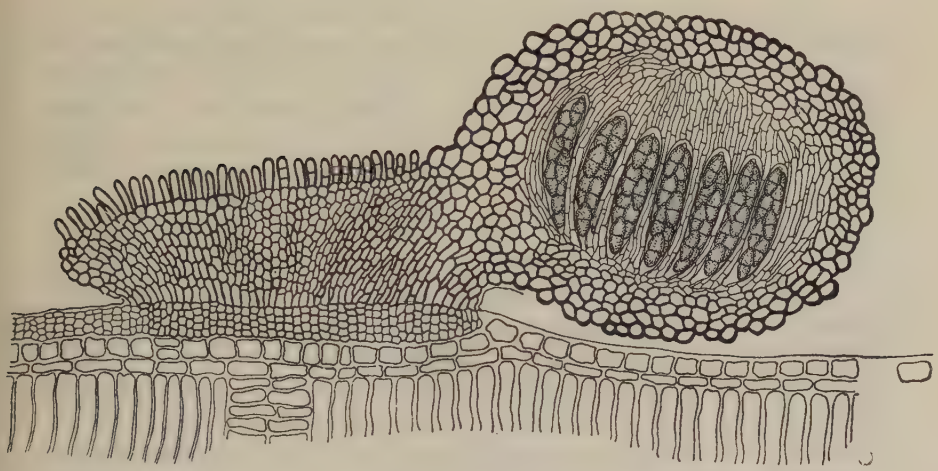

Abbildung 11. Schnitt durch ein Stroma von *Acantharia sinensis* (Petr.) v. Arx, Vergr. 250 ×.

hen von schwach gestreckten, in den Randpartien meist polyedrischen, sehr derbwandigen, blauschwarzen, im Innern mehr prismatischen, dunkelbraunen, 12—18 μ grossen Zellen, deren Wände aus dunklen Mittellamellen und diesen aufgewachsenen farblosen Sekundärwänden zusammengesetzt sind. Diese Stromata sind aussen dicht mit 20—30 μ langen und 7—9 μ breiten, zylinderischen, in zwei oder drei Zellen unterteilten, dunklen, oberflächlich stark skulptierten, stumpfen Borsten besetzt; zuweilen werden an diesen noch konidienähnlich angeschwollene Zellen abgeschnürt.

Viele Stromata sind steril, wenige tragen einen und ganz selten mehr als einen Fruchtkörper. Diese sind kugelig oder meist etwas niedergedrückt, 250—350 μ breit und 200—300 μ hoch, sehr derbwandig und aus aussen recht grossen, gegen innen kleiner werdenden, dickwandigen, polyedrischen Zellen aufgebaut. Anfänglich sind sie völlig geschlossen; erst spät öffnen sie sich durch unregelmässiges Ausbröckeln der Scheitelpartie. Die Asci sind breit keulig oder ellipsoidisch, 80—100 ⇌ 15—19 μ gross, derb- und doppelwandig, achtsporig und von breit-fädigen, kurzgliederigen Paraphysoiden umgeben, wel-

che über den Asci in ein aus kleinen, zartwandigen Zellen bestehendes hyalines Geflecht übergehen. Die Ascosporen sind breit ellipsoidisch, beidendig breit abgerundet, seltener etwas verjüngt, in der Mitte septiert und meist schwach eingeschnürt, dunkelbraun, 18—25 ⇌ 8—11 µ gross (vgl. auch Abb. 15, *a* und *b*).

Fundort: auf lebenden Blättern von *Castaneopsis indica* A.DC. Indien, Kumaon, Nainital, Kilbury 5. 5. 1957.

12. **Atopospora taxi** (Wor.) comb. nov.

Woronichin (1916) beschrieb aus dem Kaukasus einen auf lebenden Nadeln von *Taxus baccata* L. vorkommenden Pilz und stellte ihn als *Dothidea taxi* Wor. zur Ascomycetengattung *Dothidea* Fr. Die Diagnose findet sich nicht in der „Sylloge Fungorum" von Saccardo, hingegen ist sie z. B. wiedergegeben bei Woronow (1922). Woronichin (1927) reihte den Pilz dann später — wegen seiner braunen Sporen — bei *Systremma* Theiss. et Syd. ein.

Die Gattung *Dothidea* Fr. hat erst kürzlich eine Bearbeitung erfahren (Loeffler, 1957), wobei sie streng auf die in den wesentlichen Merkmalen mit dem Typus, *Dothidea sambuci* Fr. übereinstimmenden Arten, allerdings ungeachtet ihrer Sporenfärbung und -septierung eingeschränkt wurde. Der vorliegende Pilz weicht nun schon — beurteilt nach seiner Diagnose — sowohl morphologisch, wie auch biologisch von den uns bekannten Arten von *Dothidea* ab; er besitzt nämlich viel kleinere, nur wenige Loculi enthaltende Stromata und er wächst parasitisch auf lebenden Nadeln.

Ich habe einen mit der Beschreibung von *Dothidea taxi* Wor. gut übereinstimmenden Pilz auch im Himalaya auf *Taxus Wallichiana* Zucc. [= *Taxus baccata* L. ssp. *Wallichiana* (Zucc.) Pilger] gefunden; er weicht in der vorliegenden einzigen Kollektion durch das Wachstum auf abgestorbenen Nadeln etwas ab, stimmt aber in seinen morphologischen Merkmalen sehr gut mit der Beschreibung von Woronichin (1916) überein. Da aber das Material im Frühjahr gesammelt wurde, ist anzunehmen, dass es sich dabei nur um die letzte Phase des Entwicklungszyklus handelt, der Pilz also schon im Herbst auf den lebenden Nadeln vorhanden war. Es finden sich tatsächlich auch schon recht viele entleerte Loculi.

Aber zu *Dothidea* Fr. (= *Systremma* Th. et Sydow, 1915) in der heutigen Umschreibung der Gattung kann der *Taxus*pilz nicht gestellt werden. Es handelt sich vielmehr um eine subkutikuläre Stromata entwickelnde Venturiacee, deren Fruchtkörper loculiartig eingesenkt sind. Bisher sind mir noch keine auf Gymnospermen wachsende Venturiaceen von diesem Typ bekannt geworden; hingegen stimmt der Pilz im Prinzip mit der *Betula* bewohnenden *Atopospora betulina* (Fr.) Petr. [Typus der Gattung *Atopospora* Petrak, 1925] überein; ein wesentlicher Unterschied besteht nur in den Sporen: bei *Atopospora*

betulina sind sie im obern Drittel septiert und grünlich, beim *Taxus* bewohnenden Pilz sind sie in der Mitte septiert und schmutzigbraun. Es wäre aber kaum zweckmässig, die beiden Pilze in verschiedene Gattungen zu stellen, wenn es auch nicht als erwiesen gelten kann, dass sie eine sehr nahe phylogenetische Beziehung zueinander haben. Der Pilz lässt sich folgendermassen beschreiben:

Atopospora taxi (Wor.) comb. nov.

Synonyme: *Dothidea* taxi Wor. — Iswestia Kaukas. Mus. **10**, 4 (1916).
Systremma taxi (Wor.) Wor. — Traveaux du Musée Botanique, Acad. Sci. URSS, **21**, 116 (1927).

Die auf den Nadeln des Wirtes ziemlich dichtgedrängten, subkutikulären, rundlichen oder in der Längsrichtung der Nadeln gestreckten Stromata sind ziemlich verschieden gross, 120—300 µ breit, 200—600 µ lang und 100—130 µ hoch, oben durch die etwas vorspringenden Loculi rauh und unten scharf gegen das Wirtsgewebe abgegrenzt, dringen hingegen mit rundlichen, 6—9 µ grossen, hellen und zartwandigen Zellen noch etwas in dieses ein. Sie sind aus 6—9 µ grossen, dunkelbraun gefärbten, rundlichen oder unregelmässig eckigen, derbwandigen Zellen aufgebaut, manchmal sind diese Zellen auch zwischen den Loculi senkrecht gestreckt und fast prosenchymatisch angeordnet, hier zuweilen auch etwas heller gefärbt und mit weniger derben Zellwänden versehen. Die wenig zahlreichen, (1—3) Loculi besitzen keine vom Stromagewebe differenzierte Wand; sie sind kugelig, kegelförmig, zuweilen aber auch durch gegenseitige Beeinflussung ganz unregelmässig, 60—100 µ gross.

Die Asci sind zylinderisch-keulig, oft unten etwas sackartig erweitert, am Scheitel ziemlich flach, derb- und doppelwandig, 40—55 ⇌ 11—14 µ gross und achtsporig. Sie sind von zellig-faserigem Gewebe umgeben. Die zweireihig gelagerten, ellipsoidischen, zuweilen an den Enden undeutlich sich verjüngenden Ascosporen sind 12—15 ⇌ 5—7 µ gross, zunächst hyalin, färben sie sich später rauchbraun an (vgl. auch Abb. 15, *g*).

Fundort: auf Nadeln von *Taxus Wallichiana* Zucc. [= *Taxus baccata* L. ssp. *Wallichiana* (Zucc.) Pilger]. Indien, Kumaon, Ostgarhwal, Wan Valley, Wan, 30. 5. 1957.

13. **Gibbera prinsepiae** (Chona, Munjal et Kapoor) comb. nov.

Chona, Munjal und Kapoor (1956) haben einen auf *Prinsepia utilis* Royle (endemische Prunoideae) vorkommenden Parasiten als *Karschia prinsepiae* beschrieben und mit einer schematischen Abbildung belegt. Wahrscheinlich stand den Autoren schlecht entwickeltes, möglicherweise auch recht altes Material zur Verfügung; denn die Abbildung zeigt tatsächlich einen weit geöffneten Fruchtkörper, wie dies bei *Karschia* Körb. beobachtet werden kann. Hingegen stimmt sowohl das stark entwickelte Hypostroma wie auch das parasitischeWachstum nicht mit den typischen Vertretern dieser Gattung

überein; schon aus der Beschreibung kann deshalb geschlossen werden, dass der Pilz bei *Karschia* nicht richtig eingeordnet ist.

Eigene Beobachtungen zeigen, dass der Pilz nicht selten ist. Stellenweise waren sogar sämtliche Sträucher des Wirtes, welche häufig als Feldeinfassungen und auf Lesesteinhaufen vorkommen, vom Pilz in starkem Masse parasitiert, sodass ich ihn reichlich sammeln konnte. Aber das meiste Material war entweder alt oder viel zu jung. Nur in einer einzigen Kollektion (aus Ostgarhwal) konnte ich

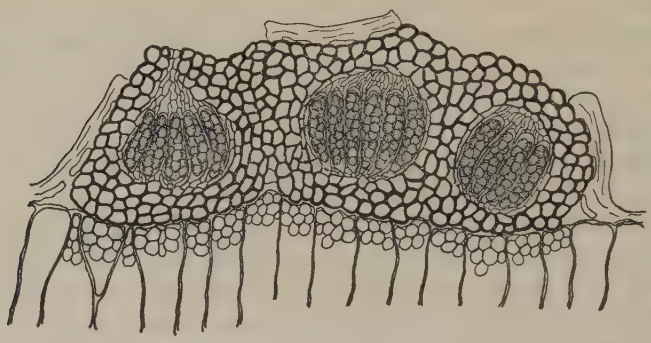

Abbildung 12. Schnitt durch ein Stroma von *Atopospora taxi*. Vergr. 250×.

auch ausgereifte Fruchtkörper finden, welche es mir erlaubten, die von den ersten Autoren aufgesetzte Beschreibung zu ergänzen und den Pilz auch richtig einzureihen. Er lässt sich folgendermassen beschreiben:

Der Pilz bildet auf den lebenden Zweigen, seltener auch auf den Blättern rundliche, bis zu 5 mm grosse, schwarz samtene Flecke, welche zuweilen zu mehreren zusammenfliessen und grössere Partien deckende Überzüge bilden. Im Schnitt erkennt man kompliziert gebaute, in ihrer Ausgestaltung sehr variable Stromata, welche sich im Wirtsinnern weit ausdehnen und auch oberflächlich mächtig entwickelt sind.

Die keimende Spore dringt mit ihrem Keimschlauch wahrscheinlich durch ein Stoma in die Wirtspflanze ein, bildet zunächst in der Atemhöhle einen kleinen Hyphenknäuel und dringt dann von hier aus einmal unter der Kutikula seitwärts, dann den Zellwänden folgend auch nach unten in die Epidermis und in das darunterliegende Palisadengewebe ein. Meist ist das Hypostroma auf die Interzellularen beschränkt, doch vermag es zuweilen auch in die Zellwandpartien einzudringen; stets werden die Zellen abgetötet und schwach bräunlich verfärbt. Die Zellen des Hypostromas sind braun, ziemlich derbwandig, rundlich oder meist deutlich prismatisch, 7—10 μ gross; in den Randpartien sind sie heller und weniger derbwandig. Später

werden die Stromata stellenweise mächtiger und kompakter, erfassen alle umliegenden Zellen und brechen dann mehr oder weniger örtlich begrenzt durch die Kutikula, wobei diese aufgesprengt, oft aber auch stückweise emporgehoben wird und zuweilen später in Fragmenten hoch oben im Basalstroma wiederum in Erscheinung tritt. —

Über der Kutikula wird das oberflächliche Stroma breiter, und es setzt sich zusammen aus oft deutlich divergierenden Reihen von senkrecht gestreckten, 6—10 μ grossen, derbwandigen, dunkelbraunen Zellen. Es wird bis 350 μ hoch und dehnt sich manchmal nach allen Seiten weit aus, wobei es oft benachbarte Stromapartien erreicht, sich mit diesen verflicht und zuletzt ohne eigentliche Grenze mit diesen zusammenwächst. Es entsteht so ein weites, kompaktes, an mehreren Stellen mit dem intramatrikalen Hypostroma verbundenes Basalstroma. Zuweilen bleiben die einzelnen Partien aber auch isoliert und bilden dann rundlich polsterförmige Höcker. Stets aber sind sie mit zahlreichen, bis 350 μ langen, an der Basis bis 6 μ dicken, derbwandigen, dunkelbraunen, am Ende allmählich heller werdenden und stumpf endenden Borsten bekleidet, welche zuweilen einzeln abstehen, meist aber deutlich Büschel bilden und seitlich oft auch wagrecht abstehende Kränze formieren.

Die kugeligen oder meist liegend ellipsoidischen, 180—250 μ grossen Fruchtkörper sind dunkel gefärbt. Oft stehen sie mit einem mehr oder weniger deutlich entwickelten stromatischen Fuss auf dem Basalpolster, sind mit diesem zum Teil verwachsen, im übrigen nur durch dunkle Hyphen verbunden. Sie besitzen eine derbe, aus dickwandigen, polyedrischen, 8—12 μ grossen Zellen zusammengesetzte Wand und sind am Scheitel mit einem engen Mündungskanal versehen. Die Asci sind reif 70—80 ⇌ 14—18 μ gross, keulig, oben breit abgerundet, unten oft etwas sackartig, derb- und doppelwandig und sie enthalten je 8 Ascosporen. Diese sind breit ellipsoidisch, an den Enden oft etwas verjüngt oder beidendig breit abgerundet, in der Mitte septiert und deutlich eingeschnürt, olivenbraun, 14—18 ⇌ 6—7 μ gross. Umgeben ist der Pilz von zelligen und ziemlich breit fädigen, über den Asci häufig schwach bräunlich gefärbten, im übrigen aber hyalinen Paraphysoiden (vgl. auch Abb. 15, d).

Fundort: auf lebenden Zweigen und Blättern von *Prinsepia utilis* Royle. — Indien, Himalaya, Kumaon. Ostgarhwal, Wan Valley, Wan, 31. 5. 1957. — Ranikhet/Chaubattia (Almora), 21. 5. 1957.

Unzweifelhaft gehört dieser Pilz auf Grund seiner Stromaausbildung, auf Grund der Asci und Sporen und auf Grund des Borstenbesatzes zu den *Venturiaceae* in die Nähe von *Gibbera* Fr. (vgl. Petrak, 1947 a). Er unterscheidet sich von deren Typusart *Gibbera vaccinii* Fr. durch die sehr stark mit Borsten besetzten Basalstromata und die kahlen Fruchtkörper (*Gibbera vaccinii* besitzt im Gegensatz dazu kahle Stromata und mit kurzen Borsten besetzte Fruchtkörper).

Er passt aber im übrigen recht gut in diese Gattung, sodass sich für ihn folgende Neukombination ergibt:

Gibbera prinsepiae (Chona, Munjal et Kapoor) E. Müller.
Synonym: *Karschia prinsepiae* Chona, Munjal et Kapoor. — Indian Phytopathology **9**, 125 (1956).

Abbildung 13. Schnitt durch ein Stroma von *Gibbera prinsepiae*. (schematisiert). Vergr. 50×.

13. *Venturia lonicerae* (Fuck.) Sacc.

Venturia lonicerae (Fuck.) Sacc. gilt allgemein als seltener Pilz, dessen Verbreitung und Wirtswahl noch ungewiss und dessen Biologie noch unerforscht ist. Aus den mir vorliegenden Belegstücken kommt er auf *Lonicera xylosteum* L., auf *Lonicera nigra* L. und *Lonicera coerulea* L. in den Alpen vor, selber habe ich ihn wiederholt auf diesen Wirten gesammelt. Nach Fuckel (1869) kommt er auf *Lonicera xylosteum* L. auch im Rheinland (Oestrich) vor; dieses Material ist auch von Winter (1887) nachgeprüft worden, wobei er allerdings nur unreife Fruchtkörper feststellen konnte. Ebenso erwähnt Fuckel (1869) den Pilz aus dem schweizerischen Jura.

Auf dürren Blättern von *Lonicera quinquelocularis* Hardw. habe ich nun im Himalaya den Pilz ebenfalls gefunden. Es ist daher sehr wahrscheinlich, dass *Venturia lonicerae* eine viel grössere Verbreitung besitzt, als aus den bisherigen Angaben entnommen werden kann; möglicherweise deckt sich sein Verbreitungsgebiet mehr oder weniger mit dem der Wirtsgattung *Lonicera* L. Morphologisch stimmen die Fruchtkörper aus dem Himalaya gut mit denen aus Zentraleuropa überein. Sie wachsen in Herden auf grau verfärbten Blattstellen, sind kugelig oder undeutlich flaschenförmig, 80—120 μ gross, am Scheitel mit rundlicher Mündung versehen und aussen spärlich mit dunkelbraunen, sehr verschieden langen, zelligen, am Ende zugespitzten Borsten besetzt. Die Asci sind sackförmig, oben breit abgerundet, 40—50 ⇌ 8—9 μ gross, achtsporig und von zellig-faserigen Paraphysoiden umgeben. Die Ascosporen sind ellipsoidisch oder undeutlich keulig, meist etwas über der Mitte septiert und kaum ein-

geschnürt, 8—10 ⇌ 4—5 μ gross, olivengelb bis schmutzig braun-grau (vgl. Abb. 15, c).

Fundort: auf überwinterten Blättern von *Lonicera quinquelocularis* Hardw. Indien, Kumaon, Chaubattia (Almora), 21. 5. 1957.

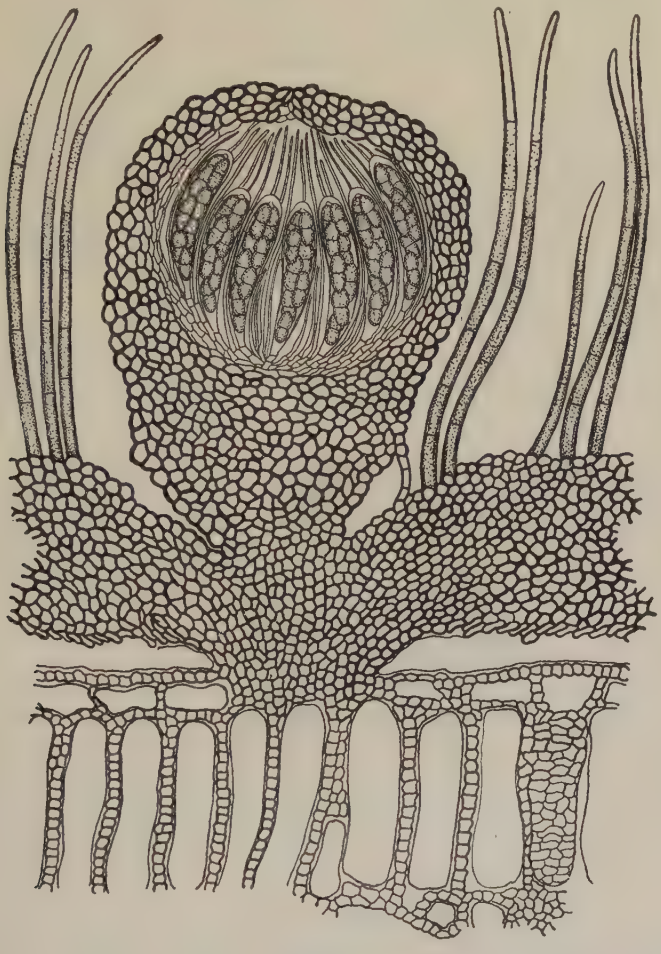

Abbildung 14. Schnitt durch eine Stromapartie mit einem Fruchtkörper von *Gibbera prinsepiae*. Vergr. 250 ×.

15. *Dimerium Langloisii* (Ell. et Ev.) Sacc. et Syd.

Sydow (in Sydow, Mitter und Tandon, 1937) beschrieb aus Indien eine auf *Ilex Wightiana* Wall. lebende *Asterina Mitteriana*. Ich konnte diesen Pilz, — in einer der Originalbeschreibung in allen Teilen übereinstimmenden Form — auch auf *Ilex dipyrena* Wall. nachweisen, der Pilz scheint also im Gebiet eine ziemlich weite Verbreitung und auch einen weiten Wirtskreis zu besitzen.

Nur sind viele der Rasen parasitiert. Der parasitierende Pilz spinnt zwischen die Myzelhyphen des Wirtspilzes ein aus dünnwandigen, 2,5—3 μ dicken, hellbraunen, verzweigten und kurzen Gliedern bestehendes, ziemlich lockeres, sich aber stellenweise stark verdichtendes Geflecht, auf denen locker zerstreut die bis 90 μ grossen, mehr oder weniger kugeligen, dunkelbraunen Fruchtkörper stehen. Diese besitzen am Scheitel einen rundlichen Porus und eine aus meist nur einer, seltener auch zwei Schichten polyedrischer, dickwandiger, nach aussen zuweilen schollig abbröckelnder, 6—8 μ grosser Zellen bestehende Wand. Die derb- und doppelwandigen, sich nach unten deutlich sackartig erweiternden und dann in einen kurzen Stiel zusammengezogenen, am Scheitel breit abgerundeten, 40—50 ⇌ 14—16 μ grossen Asci sind von atypischen, verschleimenden, oft bei der Reife schon fast verschwundenen Paraphysoiden umgeben. Die zu je acht zweireihig, im untern Teil unregelmässig dreireihig im Ascus liegenden Sporen sind 10—15 ⇌ 5—6 μ gross, in oder zuweilen etwas über der Mitte septiert, mit etwas breiterer Oberzelle und sich undeutlich verjüngender Unterzelle versehen und tief olivenbraun gefärbt (vgl. Abb. 15, e und f).

Fundort: auf den Rasen von *Asterina Mitteriana* Syd. (auf *Ilex dipyrena* Wall. parasitierend), Indien, Kumaon, Chaubattia, 15. 5. 1957.

Wir verdanken es Hansford (1946), dass innerhalb der Dimerieen, zu denen unser Pilz unzweifelhaft gehört, etwas Ordnung gekommen ist. Es fehlte in dieser Gruppe weder an der Beschreibung von Gattungen noch von Arten, so dass Hansford eine grosse Zahl von Formen untersuchen musste, um auf eine einigermassen übersichtliche und den tatsächlichen Verhältnissen gerecht werdende Einteilung zu kommen. Er erwähnt in seiner Bearbeitung, dass seine unterschiedenen Arten Gruppen von morphologisch oft kleine Unterschiede aufweisenden Formen darstellten, sich aber keinesfalls in eindeutig umschreibbare Arten aufteilen liessen. Auf Grund seines Schlüssels habe ich die vorliegende Kollektion zu dem aus Amerika beschriebenen und dort ebenfalls auf *Asterina* parasitierenden *Dimerium Langloisii* (Ell. et Ev.) Sacc. et Syd. gestellt, nachdem ich auch amerikanisches Material mit unserm Pilz verglichen hatte.

16. *Leptosphaeria Castagnei* (Dur. et Mont.) Sacc.

Leptosphaeria Castagnei (Dur. et Mont.) Sacc. besitzt so charakteristisch gebaute Sporen, dass sie kaum mit irgendeiner andern *Leptosphaeria*-Art verwechselt werden könnte. Sie ist z. B. bei Winter (1887) gut umschrieben und wurde auch von mir (Müller, 1950) in der Bearbeitung der schweizerischen Leptosphaerien berücksichtigt. Darnach besitzt sie unter der Rinde nistende, kugelige oder schwach niedergedrückte, 150—250 μ grosse Fruchtkörper mit nur schwach vorgezogenen, anfangs durch kleine, hyaline Zellen ver-

schlossenen, sich später durch einen rundlichen Kanal öffnenden Mündungen. Die Gehäusewand ist 15—20 μ dick, am Scheitel bedeutend derber und aus ziemlich stark zusammengedrückten, dickwandigen, rötlichbraunen Zellen aufgebaut. Die zahlreichen, zylinderisch-keuligen, derb- und doppelwandigen, am Scheitel breit abgerundeten, an

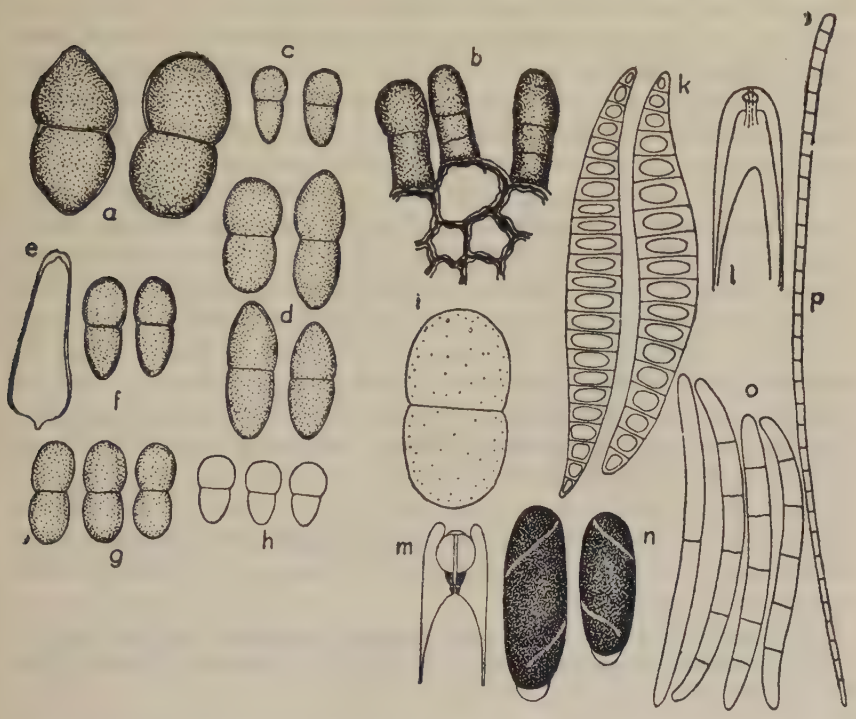

Abbildung 15. *Acantharia sinensis.* a) Ascosporen; b) Randpartie des Stromas mit Borsten; c) Ascosporen von *Venturia lonicerae*; d) Ascosporen von *Gibbera prinsepiae* (alle Vergr. 1000×); e) *Dimerium Langloisii,* Ascus, (Vergr. 500×); f) Ascosporen (Vergr. 1000×); g) Ascosporen von *Atopospora taxi;* h) Ascosporen von *Leptopeltis indica*; i) Ascospore von *Pseudomassariella vexata*; k) *Saccardoella transylvanica,* Ascosporen (alle Vergr. 1000×); l) Ascusspitze; m) *Entosordaria spiralis,* Ascusspitze (beide Vergr. 500×); n) Ascosporen; o) Ascosporen von *Plagiosphaera Bhargavai* (beide Vergr. 1000×); p) Ascospore von *Nodulosphaeria Deutziae,* Vergr. 500×.

der Basis kurz gestielten, 110—130 ⇌ 14—18 μ grossen, achtsporigen Asci sitzen der ganzen Wand entlang. Sie sind von zahlreichen, fädigen und hyalinen Paraphysoiden umgeben und enthalten ein- bis zweireihig angeordnete, zylinderische, mit meist 7—10 Querwänden septierte, 32—42 ⇌ 6—8 μ grosse, zunächst braungelbe, später schön tiefbraun gefärbte Sporen mit deutlichem Epispor.

Holm (1957) hat die Gattung *Leptosphaeria* Ces. et de Not. in einige kleinere Gattungen zerlegt, diese charakterisiert und mit Arten belegt. Die vorliegende Art wurde von ihm nicht berücksichtigt. Es ist deshalb auch in Bezug auf sie zu überprüfen, ob die Gattungszuteilung noch richtig ist. Was die Sporen anbelangt, so nimmt *Leptosphaeria Castagnei* eine Sonderstellung ein; sie scheint gewissen *Pleospora*-Arten wie *Pleospora oblongata* Niessl näher zu stehen und man erwartet, hie und da auch einmal längsseptierte Sporen feststellen zu können. Im Bau der Fruchtkörperwand stimmt sie aber ganz gut mit *Leptosphaeria* s. str. überein, weshalb es sich als zweckmässig erweisen dürfte — solange nicht neue Gesichtspunkte zu Tage gefördert werden — die Art bei *Leptosphaeria* Ces. et de Not. zu belassen.

Über ihre Verbreitung wissen wir nur wenig. Sie ist aus Nordafrika beschrieben und später auch für Süd- und Mitteleuropa (z. B. Saccardo, 1879, Petrak, 1947b, Müller, 1950) nachgewiesen. Erst vor kurzem wurde sie auch für die Türkei angegeben (Petrak, 1956), darüber hinaus fehlen aber Verbreitungsangaben.

Ähnlich spärlich sind die Angaben über die Wirtspflanzen. Beschrieben auf *Jasminum fruticans* L., wurde *Leptosphaeria Castagnei* meist nur auf *Jasminum* angegeben, sei es auf einheimischen Arten, sei es auf eingeführten Gartenpflanzen. Immerhin gibt Saccardo (1883) den Pilz auch für *Evonymus europaeus* L. an.

Wie die untenstehenden Angaben zeigen, habe ich den Pilz in Indien mehrmals auf verschiedenen Wirten gesammelt. Es ist deshalb anzunehmen, dass sein Areal weit über Mitteleuropa und das Mittelmeergebiet hinaus reicht.

Fundort: auf abgestorbenen Zweige von *Jasminum humile* L., *Clematis montana* Ham. und *Hypericum* spec., Indien, Kumaon, Nainital, Weg nach Kilbury am 12. 5. 1957 und am 24. 6. 1957.

17. *Melanomma Coniothyrium* (Fuck.) Holm.

Holm (1957) hat den bis dahin als *Leptosphaeria Coniothyrium* (Fuck.) Sacc. geführten, meist auf *Rubus* vorkommenden Pilz zu *Melanomma* gestellt und ihn auch mit einer ziemlich ausführlichen Beschreibung versehen. Darnach enthalten die kugeligen, zuweilen aber auch etwas abgeplatteten, 200—300 μ grossen, von einer ca. 15 μ dicken, aus einigen Lagen von etwas abgeplatteten Zellen aufgebauten Wand umgebenen Fruchtkörper zahlreiche 70 ⇌ 6 μ grosse, zylinderisch-keulige Asci, in denen je acht Sporen sitzen. Diese sind spindelig, 12—15 ⇌ 3,5—4,5 μ gross, 4-zellig und bleich olivenbraun gefärbt.

Holm äussert sich auch über die Verbreitung. Neben zahlreichem europäischem Material hat er auch solches aus Nordamerika untersucht und dabei vollständige Übereinstimmung gefunden. Mein Fund aus Indien ist deshalb kaum überraschend; wahrscheinlich ist

der Pilz der Gattung *Rubus* über ihr ganzes Verbreitungsgebiet gefolgt.

Fundort: auf *Rubus lasiocarpus* Sm., Indien, Himalaya, Kumaon, Bindsar (Almora), 23. 5. 1957.

18. *Gibberidea rhododendri* (Niessl) Petr.

Gibberidea rhododendri (Niessl) Petr., meist unter *Melanomma rhododendri* Rehm bekannt (z. B. Winter, 1887), wurde von Petrak (1931) eingehend untersucht und beschrieben und vom selben Autor (Petrak, 1934) nochmals diskutiert, wobei auch die Synonymie geklärt wurde. Der Autor erkannte die Verwandtschaft mit *Cucurbitaria* Gray; da aber die Sporen des Pilzes lediglich Querwände aufwiesen, stellte er die Art in die entsprechende Gattung *Gibberidea* Fuck. (Petrak (1934) erwähnte die ziemlich zahlreichen Synonyme; der Pilz war nacheinander als *Cucurbitaria rhododendri* Niessl, *Melanomma rhododendri* Rehm, *Sphaeria rhododendri* Cooke, *Phragmodothis rhododendri* (Niessl) v. Höhn. und *Gibberidea rhododendri* (Rehm) Petr. eingereiht worden.

Petrak (1931) geht auch auf die Verbreitung des Pilzes ein und erwähnt den in Mitteleuropa häufig auf *Rhododendron ferrugineum* L. und *Rhododendron hirsutum* L., vorkommenden Pilz auch für *Rhododendron chrysanthum* Pall. (= *Rhododendron aureum* Georgi) aus dem Altai.

So ist auch für diesen Pilz der Fund im Himalaya nicht überraschend; er dürfte in den asiatischen Gebirgen ebenso häufig sein wie in Europa.

Fundort: auf dürren Ästen von *Rhododendron campanulatum* D. Don. Indien, Himalaya, Kumaon, Ostgarhwal, Nanda Gini Valley, Bhuna, 3200 m. s. m. 2. 6. 1957.

19. *Herpotrichia pinetorum* (Fuck.) Winter.

Auf Material von *Rubus lasiocarpus* Sm. fand ich einen Pilz, der dichte, filzige Überzüge aus braunen Hyphen bildet und dessen Fruchtkörper oberflächlich wachsen. Seine Ascosporen sind vierzellig, spindelförmig, 30—35 ⇌ 6—8 µ gross, hyalin, und zuletzt schwach gelb gefärbt. Am besten passt er zu Berlese's Abbildung von *Enchnosphaeria pinetorum* Fuck. (Berlese, 1894); ich möchte ihn trotz des abweichenden Substrates zu dieser Art stellen, die als saprophytisch wachsend schon von allen möglichen Materialien angegeben worden ist.

Die Gattung *Enchnosphaeria* Fuck. ist umstritten. Schon Winter (1887) hat sie mit *Herpotrichia* Fuck. vereinigt und *Enchnosphaeria pinetorum* Fuck. als *Herpotrichia* eingereiht. Berlese (1894) unterschied die beiden Gattungen wieder auf Grund vermeintlicher Unterschiede in der Färbung des Fruchtkörperscheitels. Von

Höhnel (1917) wies dann mit Recht darauf hin, dass dieser Unterschied gar nicht bestehe, die Fruchtkörper der betreffenden Gattungstypen (*Herpotrichia rhenana* Fuck. und *Enchnosphaeria pinetorum Fuck.*) im Gegenteil im Bau fast vollständig übereinstimmten und sich die beiden Gattungen nur durch die Form der Fruchtkörpermündung unterschieden, was allerdings eine eindeutige Trennung ermögliche. Petrak (1923) ging nochmals auf diese Sachlage ein und vereinigte die beiden Gattungen, womit er Winter (1887) recht gab. Petrak (1923) bemerkte auch die Ähnlichkeit im Fruchtkörperbau mit *Leptosphaeria* Ces. et de Not. und erklärte die beiden Gattungen als sehr nahe verwandt.

Bezüglich der Verbreitung von *Herpotrichia pinetorum* (Fuck.) Winter wissen wir nur wenig. Mein Fund aus Indien zeigt indessen, dass mit einer recht weiträumigen Verbreitung gerechnet werden muss. Bevor aber nähere Angaben möglich sind, bedarf es dringend der Abklärung, wie die Gattung systematisch zu gliedern ist.

Fundort: auf alten Stengeln von *Rubus lasiocarpus* Sm. Indien, Himalaya, Kumaon, Nainital, Tiffentop, 7. 5. 1957.

20. **Nodulosphaeria Deutziae** nov. spec.

Perithecia dispersa, primo immersa demum plus minusve erumpentia, globosa, late conica vel irregulariter tuberosa, 400—600 μ diam., glabra; ostiolum conicum, saepe elongatum, canali conici, pseudoperiphysati perforatus. Pariete perithecii ca. 60 μ crassitudine, fuscus, cellulis applanatis, brunneis, 6—12 μ magnis compositus. Asci numerosi, bitunicati, cylindracei, 200—230 ⇌ 10—12 μ, stipitati, 8-spori, paraphysoides fibroses et ramoses circumdati. Sporae filiformae, hyalinae vel subflavae, 190—210 ⇌ 2,5—3 μ, septis numerosis (plusminusve 30) dividae.

Hab. in caulibus emortuis *Deutzia stamineae* Br., Indien, Kumaon, (Himalaya), Nainital, 12. 5. 1957.

Die 400—600 μ grossen, kugeligen, breit kegelförmigen oder oft auch unregelmässig knolligen, braunen Fruchtkörper wachsen vorerst unter der Rinde, sprengen diese aber bald auf und scheinen zuletzt fast oberflächlich. Am Scheitel besitzen sie eine kegelige, manchmal ziemlich kurze, zuweilen aber auch ziemlich lang aufgesetzte Mündung, deren konischer Kanal reich mit periphysenartigen, dicht ineinander verflochtenen, hyalinen Hyphen ausgestaltet ist. Die Fruchtkörperwand ist bis 60 μ dick und besteht aus zahlreichen Lagen von derbwandigen, etwas abgeplatteten, 6—12 μ grossen, dunklen Zellen. Oft sind Substratreste, zuweilen ganze Zellen, miteingeschlossen und aussen besteht, soweit noch Substratreste vorhanden sind, keine scharfe Grenze zum Wirtsgewebe.

Die zahlreichen zylinderischen, 200—230 μ langen und 10—13 μ dicken Asci sind derb- und doppelwandig (bitunicat) und sitzen mit

einem deutlichen Stiel der ganzen Wand entlang. Sie sind von zahlreichen fädigen, sich verzweigenden, hyalinen Paraphysoiden umgeben, die auch den ganzen übrigen Fruchtkörperraum durchweben. Die zu je acht parallel im Ascus liegenden Ascosporen sind fädig, oben am breitesten, nach unten zu allmählich verjüngt, hyalin oder schwach gelblich, und durch zahlreiche (30 und mehr) Quersepten unterteilt (vgl. Abb. 15, p).

Abbildung 16. Schnitt durch einen Fruchtkörper von *Nodulosphaeria deutziae*. Vergr. 170 ×.

Diesen Pilz, der früher ohne Zweifel als *Ophiobolus* Riess eingereiht worden wäre, stelle ich heute nur bedingt in die Gattung *Nodulosphaeria* Rabenh., die von H o l m (1957) aus einem fast hundertjährigen Schattendasein wieder ans Licht gebracht worden ist. Er hat darin eine ganze Anzahl bis dahin bei *Ophiobolus* Riess und bei *Leptosphaeria* Ces. et de Not. eingereihte Arten von zweifellos naher Verwandtschaft zusammengefasst und der Gattung damit feste Umrisse gegeben. Der vorliegende Pilz passt in seinem Fruchtkörperaufbau, der wohl bei der neuen Aufteilung des Gattungsschwarmes um *Leptosphaeria* Ces. et de Not. herum eine wichtige Rolle spielt, sehr gut zu den andern Arten von *Nodulosphaeria* Rabh., hingegen

fehlen seinen Sporen sowohl die meist intensive Färbung, wie auch namentlich die angeschwollene Zelle. Dieses Merkmal kann aber für die Gattung nicht als sehr charakteristisch gelten, da noch zahlreiche Arten, welche zu andern Gattungen gestellt werden, ebenfalls einzelne verdickte Sporenzellen als charakteristisches Merkmal besitzen. Zu *Ophiobolus* Riess. emend. Holm passt er aber keinesfalls.

21. **Leptopeltis indica** nov. spec.

Ascomata dispersa, rarissime aggregata, sub cuticula nascentia, fusca, depressa, orbiculare vel plus minusve elongata vel lineamento irregulariter rotundo, 80—180 μ diam., 25—30 μ altitudine, hypostromatis subfuscis innata. Strato basali incomplete, evoluto, microparenchymatico, hyalino, tenuissime membranaceo; strato tegente non vel atypice radioso, cellulis angulatis, applanatis, 5—7 μ diam. composito, poro elongato aperto. Asci bitunicati, late ellipsoidei, 20—25 ⇌ 13—15 μ magni, 8-spori. Sporae plus minusve distichae, clavatae, 8—9 ⇌ 3,5—5 μ magnae, hyaline, ad medium septatae.

Hab. in caulibus emortuis *Eupteridis aquilinae* (L.) Newman. — Indien, Kumaon, (Himalaya), Chaubattia, (Almora), 17. 5. 1957.

Die schildförmigen, im Umriss unregelmässig rundlichen oder etwas verlängerten, 80—180 μ Durchmesser und 25—30 μ Höhe aufweisenden Fruchtkörper wachsen einzeln, ganz selten auch zu wenigen gruppenweise beisammen und nur ausnahmsweise auch verwachsen, subkutikulär. Von den Fruchtkörpern aus dringen zunächst bräunliche, weiter innen hyaline Hyphen in die darunter liegenden Wirtszellen und bilden dort ein lockeres, oft nur ganz schwach angedeutetes, aus rundlichen, hyalinen Zellen gebildetes Stroma. Die Fruchtkörper besitzen eine dünne, manchmal nur aus einer Schicht zusammengepresster, unregelmässig eckiger, 5—7 μ grosser, hellbrauner, nur am Rande in undeutlich radiär geordnete Reihen verlaufender Zellen bestehende Deckschicht und eine aus 2—3 μ grossen, hyalinen, zartwandigen, prismatischen, stets nur in einer Schicht angeordneter Basis. Bei der Reife öffnen sie sich durch Zerreissen der Deckschicht, welche in einzelne Lappen zerfällt.

Die sehr breit ellipsoidischen, 20—25 ⇌ 13—15 μ grossen, doppel- und dickwandigen, am Grunde in einen stumpfen Stiel zusammengezogenen Asci sitzen parallel nebeneinander und sind durch ein aus senkrecht verlaufenden, ziemlich derben, hyalinen Fasern aufgebautes paraphysoides Geflecht voneinander getrennt. Sie enthalten je acht keulige, beidendig breit abgerundete, 8—9 ⇌ 3,5—5 μ grosse, hyaline, in der Mitte septierte und schwach eingeschnürte Sporen (vgl. auch Abb. 15, h).

Der oben beschriebene Pilz kann nur in die von Petrak (1947) ausführlich beschriebene Gattung *Leptopeltis* v. Höhn. gestellt werden, mit deren Typus, *Leptopeltis aquilina* (Fr.) Petr. er das Hypo-

stroma und die nicht deutlich radiär aufgebauten Fruchtkörper gemeinsam hat. Die Fruchtkörper des indischen Vertreters dieser Gattung, der auf demselben Wirt wächst wie die europäische Typusart, sind aber im Durchschnitt bedeutend kleiner, das Hypostroma ist schwächer entwickelt und heller gefärbt, und vor allem sind seine Sporen kürzer, relativ breiter und deutlich keulig. Ich habe verschiedene Proben der Typusart mit dem indischen Material verglichen und stets volle Übereinstimmung des europäischen Materials mit Petrak's Beschreibung gefunden.

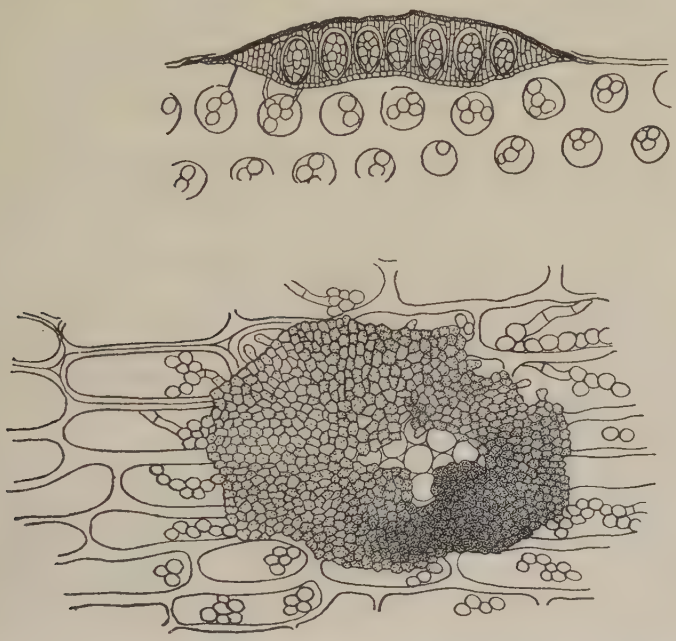

Abbildung 17. *Leptopeltis indica.* Oben: Schnitt durch einen Fruchtkörper; unten: Sicht auf einen Fruchtkörper; beide Vergr. 250 ×.

22. *Dothithyriella litigiosa* (Desm.) v. Höhn.

Auf demselben Wirt wie die oben beschriebene *Leptopeltis indica* fand ich auch *Dothithyriella litigiosa* (Desm.) v. Höhn. Dieser Ascomycet ist in Europa auf *Eupteris aquilina* (L.) Newman häufig; gut ausgereiftes Material wird aber selten gesammelt und ist daher in den meisten Herbarien schlecht vertreten. Dieser Pilz unterscheidet sich von *Leptopeltis* deutlich durch die meist zu wenigen zusammengewachsenen, mit deutlich radiär aufgebauter Deckschicht versehenem Fruchtkörper und die stärker septierten, bis vierzelligen Ascosporen.

Der unten aufgeführte Fund aus Indien zeigt, dass dem Pilz eine recht weite, sich möglicherweise mit dem ganzen Areal des Wirtes deckende Verbreitung zukommt. Er ist aber unscheinbar, weshalb er auch häufig übersehen werden dürfte.

Fundort: auf *Eupteris aquilina* (L.) Newman. — Indien, Kuamon (Himalaya), Bindsar (Almora), 23. 5. 1957.

23. *Pseudomassariella vexata* (Sacc.) Petr.

Erst kürzlich hat Petrak (1955) den auf dürren Zweigen von *Cornus sanguinea* L. in Europa vorkommenden, als *Didymella vexata* Sacc. beschriebenen Ascomyceten näher untersucht und darauf eine neue Gattung begründet, welche mit *Pseudomassaria* Jacz. am nächsten verwandt ist, sich aber durch die nicht apiosporen, sondern gleichzelligen Ascosporen unterscheidet. Er nannte sie *Pseudomassariella.*

Pseudomassariella vexata (Sacc.) Petr. kommt auch im Himalaya vor. Ich sammelte ihn auf dürren Zweigen von *Cornus capitata* Wall., und der Vergleich mit Petrak'schem Material ergab vollständige Übereinstimmung. Der Pilz besitzt 250—300 µ grosse, niedergedrückt kugelige, dem Substrat vollständig eingesenkte Perithecien, welche am Scheitel eine ganz flache, von einem periphysierten Kanal durchbohrte Mündung aufweisen und deren ziemlich dicke Peritheciemwand aus mehreren Schichten von nicht sehr derbwandigen, seitlich und an der Basis stark, am Scheitel kaum zusammengepressten Zellen besteht. Die Asci sind wenig zahlreich, ellipsoidisch, einfach- und zartwandig, 55—85 ⇌ 23—33 µ gross und am Scheitel mit einfachem Apikalapparat versehen. Die Paraphysen sind fädig, mehr oder weniger stark verzweigt; zur Reifezeit verschleimen sie. Die breit ellipsoidischen, in der Mitte septierten, kaum eingeschnürten Ascosporen sind hyalin, von einem körnigen Plasma erfüllt und färben sich später etwas gelblich; sie messen 21—30 ⇌ 9—12 µ (vgl. Abb. 15, i).

Fundort: auf dürren Zweigen von *Cornus capitata* Wall. — Indien, Kuamon Kumaon, Bindsar, Wald unter dem Forest Rest House (Almora). 23. 5. 1957.

24. *Saccardoella transylvanica* (Rehm) Berl.

Spärlich fand ich auf abgestorbenen Zweigen von *Lonicera quinquelocularis* Hardw. auch *Saccardoella transylvanica* (Rehm) Berl. Dieser von Berlese (1894) prachtvoll abgebildete Pilz wurde von Rehm (1883) als *Zignoella* beschrieben, Berlese (1894) stellte ihn dann zur älteren Gattung *Saccardoella,* welche *Zignoella* wahrscheinlich nahe steht. Der Pilz lässt sich folgendermassen beschreiben:

Die grossen, meist über 500 µ Durchmesser aufweisenden, kugeligen Fruchtkörper sind einzeln dem Holz vollständig eingesenkt und aussen nur an den etwas vorstehenden und zuweilen wenig hervor-

brechenden, dunklen Mündungen erkennbar. Diese sind von je einem periphysierten Kanal durchbohrt. Die Fruchtkörperwand ist bis 40 μ dick und besteht aus zahlreichen Lagen von braunen, nicht sehr derbwandigen, plattenförmigen, 5—8 μ grossen Zellen; nach innen schliesst sich eine weitere Schicht aus gleich grossen, hyalinen Zellen an. Aussen ist die Fruchtkörperoberfläche schollig, rauh und sie geht ohne scharfe Grenze in das Substrat über. Die sehr zahlreichen schmal zylinderischen, unten kurz gestielten, 250—300 ⇌ 10—12 μ grossen Asci stehen der ganzen innern Wand entlang. Sie sind unitunicat, am Scheitel besitzen sie einen einfachen Apikalapparat, und sie sind von zahlreichen fädigen, hyalinen, sie überragenden Paraphysen umgeben. Die zu je acht im Ascus mehr oder weniger einreihig gelagerten Sporen sind spindelförmig, beidendig schwach gekrümmt und stumpf, hyalin, 45—55 ⇌ 7—8 μ gross, und vielzellig (bis 25 Zellen). Die einzelnen Zellen sind dabei sehr derbwandig und die Zellumina entsprechend klein (vgl. Abb. 15, k und l).

Fundort: auf abgestorbenen Zweigen von *Lonicera quinquelocularis* Hardw. — Indien, Himalaya, Kumaon, Nainital, Tiffentop, 7. 5. 1957.

25. *Melomastia mastoidea* (Fr.) Schroet.

Melomastia mastoidea (Fr.) Schroet. ist in Mitteleuropa auf dürren Zweigen einiger strauchiger Wirtspflanzen nicht gerade ein gemeiner, aber immerhin ein recht oft gesammelter Pilz. Über seine Verbreitung über dieses Gebiet hinaus ist aber ziemlich wenig bekannt. Vizioli (1923) erwähnt die Art von den Bermuda-Inseln; es darf daraus geschlossen werden, dass dem Pilz ein bedeutend grösseres Gebiet zukommt, als mit den heute vorliegenden Funden bewiesen werden kann. Mein nunmehriger Fund aus Indien war demnach zu erwarten.

Fundort: auf dürren Zweigen von *Deutzia corymbosa* Br. — Indien, Himalaya, Kumaon, Nainital, 12. 5. 1957.

26. *Broomella vitalbae* (Berk. et Br.) Sacc.

Auf abgestorbenen Zweigen von *Clematis vitalba* L. findet sich in Mitteleuropa verbreitet, doch wegen seines versteckten Wachstums nicht sehr häufig gefunden, der sphaeriale Ascomycet *Broomella vitalbae* (Berk. et Br.) Sacc. Eine zweite, sichere Art dieser Gattung ist die aus Amerika beschriebene, ebenfalls auf *Clematis* wachsende *Broomella montaniensis* (E. et E.) Müller et Ahmad [Synonym: *Lophiostoma montaniensis* E. et E.]. Diese zweite Art wurde erst kürzlich (Müller und Ahmad, 1955) aus dem Gebiet angegeben (Westpakistan, Changla gali), während die europäische Art noch nicht aus Asien bekannt war. Die beiden Arten unterscheiden sich vor allem durch die Sporen; bei *Broomella montaniensis* sind diese ziemlich breit spindelförmig, vierzellig, wobei die beiden mittleren

Zellen braun gefärbt, die beiden Endzellen hell sind und überdies noch ziemlich lange Cilien tragen. Bei *Broomella vitalbae* (auch bekannt als *Ceriospora xantha* Sacc.) sind die Ascosporen bei gleicher Breite doppelt so lang, ebenfalls vierzellig, aber gleichmässig hellbraun gefärbt und an beiden Enden auch mit einer Cilie versehen.

Fundort: auf *Clematis montana* Ham. — Indien, Himalaya, Kumaon, Nainital, Cheenapeak, 12. 5. 1957.

27. *Niesslia pusilla* (Fr.) Schroeter.

Ein ebenfalls recht schwer zu findender Pilz ist *Niesslia pusilla* (Fr.) Schroet. Einmal kommt dieser sphaeriale Ascomycet nur selten gehäuft vor, meist findet man lediglich wenige Fruchtkörper. Dann aber sind diese of eingesunken und deswegen leicht zu übersehen. Auch über die Verbreitung dieses Pilzes wissen wir recht wenig. So mag denn die nachfolgende Fundortsangabe auf ein möglicherweise sehr weiträumiges Areal hinweisen:

Fundort: auf abgestorbenen Zweigen von *Lonicera* cfr. *alpigena* L. — Indien, Himalaya, Kumaon, Ostgarhwal, Nanda Gini Valley, Bhuna, 3150 m.s.m. 1. 6. 1957.

28. **Entosordaria spiralis** nov. spec.

Die Ascomycetengattung *Entosordaria* wurde von Saccardo (1882) zunächst als Untergattung von *Anthostoma* Nitschke aufgestellt und von v. Höhnel (1920) verselbständigt. Zweifellos sind die hier zusammengefassten Pilze mit *Anthostoma* verwandt; sie unterscheiden sich eigentlich nur in den Sporen, welche bei ihnen eine hyaline Anhängselzelle besitzen; es erwies sich als zweckmässig, die grosse Gattung *Anthostoma* Nitschke dadurch etwas zu unterteilen (vgl. auch von Arx und Müller, 1954).

Auf Material von *Sorbus lanata* (Don.) Wenzig habe ich eine *Entosordaria*-Art gefunden, deren Sporen neben dem hyalinen Anhängsel noch ein anderes charakteristisches Merkmal aufwiesen, nämlich einen spiralig gewundenen Keimspalt. Mit irgend einer bekannten Art konnte der Pilz nicht identifiziert werden; er sei als *Entosordaria spiralis* beschrieben:

Entosordaria spiralis nov. spec.

Perithecia substrato immersa, clypeo fusco tecta, globosa, 500—700 μ diam. Ostiolum breve cylindraceum, ca. 150 μ crassitudine, canali periphysati perforatum. Paries perithecii 40—50 μ crassus, cellulis plus minusve compressis, 8—12 ⇌ 3 μ magnis compositus. Asci cylindracei, numerosissimi, 130—160 ⇌ 8—9 μ, unitunicati, apice iodo coerulascente, 8-spori, paraphysibus numerosis, hyalinis circumdati. Sporae cylindraceae vel ellipsoideae, fuscae, 13—24 ⇌ 8—8.5 μ, fisso germinativo spirale circumdatae, base appendiculo brevi conico hyalino adhaeentae.

Hab. in cortice *Sorbi lanatae* (Don.) Wenzig — India, Himalaya, Kumaon, Ostgarhwal, Nanda Gini Valley, Bhuna, 2. 6. 1957.

[*Sorbus lanata* (Don.) Wenzig = *Pirus lanata* Don = *Pirus kumaonensis* Wall. = *Pirus aria* var. *kumaonensis* Maxim].

Die gruppenweise dem Substrat vollständig eingesenkten, 500—700 μ grossen, mehr oder weniger kugeligen Fruchtkörper sind dunkelbraun gefärbt. Am Scheitel besitzen sie eine kurze, zylinderische, zuoberst oft verdickte und bis 150 μ breite, von einem ziemlich weiten, innen reich mit Periphysen besetzten Kanal durchbohrte Mündung. Von dieser aus zieht sich unter der Rinde ein deutlicher, dunkel gefärbter Klypeus in das umliegende Wirtsgewebe. Dieser setzt sich zusammen aus braunen, nicht sehr derbwandigen, rundlichen, 4—7 μ grossen Zellen. Die Fruchtkörperwand ist 40—50 μ dick und besteht aus zahlreichen Lagen von 8—12 ⇌ 3 μ grossen, zusammengepressten, nicht sehr derbwandigen, aussen deutlich mit bräunlichem Inhalt versehenen, gegen innen heller werdenden Zellen.

Die sehr zahlreichen, der ganzen innern Wand entlang angeordneten, zylinderischen, 130—160 ⇌ 8—9 μ grossen, einfach- und zartwandigen Asci haben eine etwas verdickte Scheitelwand mit eingeschlossenem Apikalapparat. Anschliessend an das Ascuslumen mit den Sporen erstreckt sich ein ca. 3 μ langer und 2,5 μ breiter, becherförmiger, mit Jod blau färbbarer Körper gegen den Scheitel. Er ist im untern Drittel durch eine etwas weniger stark färbbare Querschicht unterteilt, und von seinem obern Rande aus reicht ein mehr oder weniger kugeliger, nicht färbbarer Plasmaball bis zum Scheitel; beide Organe umschliessen einen schmalen, zylinderischen Porus. Der Scheitel ist zentral deutlich vertieft und von schwach umgebogenen, ca. 1 μ dicken Wülsten der äussern Wandpartien umschlossen. Die Asci sind von zahlreichen, fädigen, hyalinen, sie überragenden Paraphysen umgeben, welche relativ früh schleimig zusammenkleben. Die zu je acht einreihig im Ascus liegenden Sporen sind zylinderisch oder ellipsoidisch, im Querschnitt meist ebenfalls elliptisch, einzellig, dunkelbraun, und am untern Ende mit einem kurzen, kegelförmigen, hyalinen Anhängsel versehen. Sie besitzen einen sich spiralig von oben nach unten ziehenden Keimspalt (sowohl im Uhrzeiger- wie im Gegenuhrzeigersinn gedreht) und sie messen 13—24 ⇌ 6—8,5 μ (vgl. auch Abb. 15, m und n).

29. **Plagiosphaera Bhargavai** nov. spec.

Die Diaporthaceengattung *Plagiosphaera* Petr. hat *Plagiosphaera moravica* (Petr.) Petr. [Synonym: *Ophiobolus moravicus* Petr.] als Typus. Die Gattung unterscheidet sich von *Ophiognomonia* Sacc. und *Cryptoderis* Riess durch die nicht hochgestellten, sondern liegenden Fruchtkörper mit seitlich entspringender und dann nach aufwärts gebogener Mündung; im übrigen ist sie mit diesen beiden Gattungen

nahe verwandt, und es scheint eine Ermessensfrage zu sein, ob dem erwähnten Merkmal eine solche Bedeutung zugesprochen werden darf (Petrak, 1941).

Auf abgestorbenen Zweigen von *Lonicera quinquelocularis* Hardw. habe ich einen Ascomyceten gesammelt, der recht gut zu *Plagiosphaera* passt. Ein wesentlicher Unterschied zur Typusart besteht nur im stromatischen Teil, der bei *Plagiosphaera moravica* fehlt, beim indischen Pilz vorhanden ist. Auf dem Merkmal eines Stromas allein wieder eine monotypische Gattung zu basieren, scheint mir aber zu wenig gesichert; vor allem ist es im vorliegenden Material nicht immer deutlich ausgeprägt. Der Pilz sei nachstehend beschrieben:

Plagiosphaera Bhargavai nov. spec.

Stromata tuberosa, clypeo distincto, fusco tecta, substrato immersa vel plus minusve erumpentia, peritheciis solitariis vel paucis complecta. Perithecia ellipsoidea vel irregulariter, strata, 200—300 μ longitudine, 120—180 μ crassitudine. Ostiolum latere, aliquando magnum, curvatum, perumpens clypeum, canale periphysato perforatum. Paries perithecii stratis pluribus cellularum, compressarum, 3—7 ⇌ 2—3 μ magnitudine, subfuscis compositus. Asci numerosi, cylindraceo-fusoidei, unitunicati, 75—85 ⇌ 10—12 μ magni, ab pariete abrupti, 8-spori. Sporae fusoideae, 30—45 ⇌ 2—3 μ, hyaline, leniter curvatae, 1—5-septatae.

Hab. in ramis emortuis *Lonicerae quinquelocularis* Hardw. — India, Himalaya, Kumaon, Nainital, 12. 5. 1957.

Der saprophytisch auf abgestorbenen Ästchen der Wirtspflanze wachsende Pilz bildet auf diesem pustelförmig vorstehende, knollige Stromata von 400—700 μ Durchmesser, in denen die Fruchtkörper einzeln oder zu wenigen eingesenkt sind. Die Stromata sind besonders aussen deutlich ausgebildet und bilden hier einen deutlichen Klypeus. Unter den Fruchtkörpern fehlen stromatische Partien oft fast ganz oder sind als solche nur durch dünne Partien ineinander verflochtener Hyphen angedeutet. Im klypealen Teil durchwuchern dunkle Komplexe aus derbwandigen, dunkelbraunen, sehr verschieden grossen, meist mehr oder weniger rundlichen, dann wieder hyphig gestreckten Zellen die Lumina der abgestorbenen, verholzten Wirtszellen, lösen diese auch zuweilen auf und bilden dann an deren Stelle zusammenhängende, dunkelbraune Stromapartien aus rundlichen, derbwandigen Zellen.

Die Fruchtkörper sind liegend ellipsoidisch oder sofern sie zu mehreren den Stromata eingewachsen sind, oft auch durch gegenseitige Beeinflussung unregelmässig; in der Längsachse messen sie 200—300 μ, im Querdurchmesser 120—180 μ. An ihrem seitlichen Scheitel entspringt die ziemlich lange, sich nach oben (aussen) um-

biegende und den Klypeus durchbrechende Mündung. Diese ist 60—80 μ dick, von zahlreichen Lagen aus stark zusammengepressten, zartwandigen, nur zu äusserst braun gefärbten, im übrigen fast hyalinen Zellen aufgebaut. Der Mündungskanal ist im Bereich der Ansatzstelle bei der Fruchtkörpermündung durch kissenförmige Polster aus zartwandigen, hyalinen Zellen verengert, im zentralen Teil höhlenartig erweitert und zu äusserst im den Klypeus überragenden Teil wiederum durch kuppelartig zusammenneigende Wände zu einem

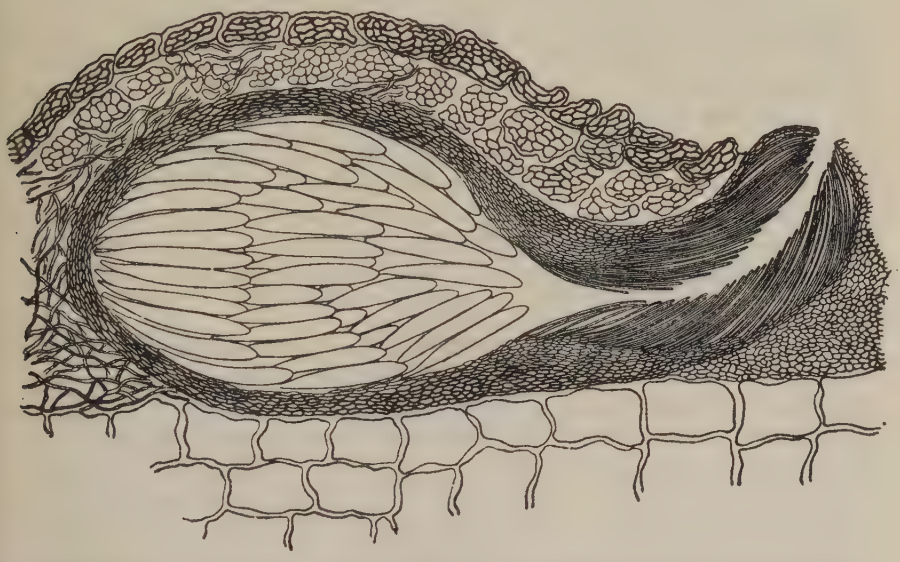

Abbildung 18. Schnitt durch einen Fruchtkörper von *Plagiosphaera Bhargavai.* Vergr.

20—30 μ weiten Loch verengt. Der Kanal ist stark periphysiert; die Periphysen sind als Fortsätze der Wandzellreihen zu betrachten. Auch die Wand der eigentlichen Fruchtkörper besteht aus einigen Schichten von 3—7 ⇌ 2—3 μ grossen, bräunlich gefärbten, mehr oder weniger zartwandigen Zellen; an sie sind zuinnerst ein bis drei Schichten aus zartwandigen, hyalinen Zellen angelagert.

Die zahlreichen zylinderisch-spindelförmigen, zartwandigen achtsporigen, 75—85 ⇌ 10—12 μ grossen Asci zeigen am Scheitel einen deutlichen Apikalring. Sie lösen sich reif leicht von der Wand und erfüllen den ganzen Fruchtkörperinnenraum. Paraphysen sind bei der Reife nicht mehr vorhanden. Die mehr oder weniger parallel nebeneinander liegenden Ascosporen sind lang-spindelförmig oder fädig, 30—45 ⇌ 2—3 μ gross, hyalin, oft und besonders an den Enden schwach gekrümmt, und mit einer wechselnden Zahl (1—5) von Quersepten unterteilt (vgl. auch Abb. 15, o).

Ich widme diese charakteristisch gebaute Art Herrn Dr. K. S. Bhargava, damals Botanikprofessor am Government College in Nainital. Manche Anregung, die für meine Sammeltätigkeit von grossem Nutzen war, stammt von ihm; er half mir auch beim Bestimmen der Wirtspflanzen und hat mir in vielen persönlichen Belangen seine hilfreiche Hand dargeboten.

30. *Rhytisma xylostei* Naoumoff.

Auf Blättern von *Lonicera*arten sollen drei Formen aus der Ascomycetengattung *Rhytisma* Fr. vorkommen, nämlich: *Rhytisma lonicerae* P. Henn. [Engl. Bot. Jahrb. **28**, 1900, p. 277] auf *Lonicera Tschonoskii* Maxim. (Japan), *Rhytisma lonicericola* P. Henn. [Engl. Bot. Jahrb. **32**, 1902, p. 43] auf *Lonicera* spec. (Japan), und *Rhytisma xylostei* Naoumoff [Champ. Oural I, 1915, p. 23] auf *Lonicera xylosteum* L. (Ural). Die erste Art fällt für jede Bestimmungsarbeit deshalb ausser Betracht, weil der Pilz in sterilem Zustande beschrieben wurde und deshalb nicht einmal festzustellen ist, ob es sich überhaupt um eine *Rhytisma*-Art handelt. Die beiden weitern Arten unterscheiden sich in den Sporen.

Auf abgestorbenen, überwinterten Blättern von *Lonicera quinquelocularis* Hardw. habe ich eine *Rhytisma* gefunden, welche mit *Rhytisma xylostei* Naoum. in den wesentlichen Teilen — Asci und Ascosporen — übereinstimmt und deshalb auch am besten unter diesem Namen eingereiht wird. Die beiden Wirtspflanzenarten (*Lonicera xylosteum* für die Originalkollektion, *Lonicera quinquelocularis* Hardw. für meine Kollektion) stehen sich recht nahe. Es kann daraus geschlossen werden, dass der Pilz in den zentralasiatischen Gebirgen weiter verbreitet ist, als nach den bisherigen spärlichen Funden angenommen werden darf und es besteht durchaus die Möglichkeit, dass der Pilz auch in Europa vorkommt. Er lässt sich folgendermassen beschreiben:

Der Pilz wächst mit kleineren oder grösseren, rundlichen oder unregelmässig begrenzten Stromata subkutikulär. Die Stromata besitzen eine braune, aus eng ineinander verschlungenen, ziemlich derbwandigen, 5—10 μ grossen, unregelmässig rundlichen Zellen aufgebaute, nach aussen zu höckerig-wellige Rindenschicht und einem hyalinen Binnenstroma, welches aus locker ineinander verflochtenen, hyphigen, zartwandigen Zellen besteht und nur wenig und auch undeutlich in die Epidermis- und Palisadenzellen eindringt.

Zerstreut in die Stromata sind die fertilen Partien eingelagert. Diese sind im Umriss rundlich oder meist etwas gestreckt; sie wölben das Stroma stark auf, wobei die Deckschicht unregelmässig aufreisst und die Fruchtschicht entblösst. Entsprechend ihrer unregelmässigen Form sind auch ihre Masse recht verschieden; meist sind

sie loculiartig und messen dann 300—500 μ in der Breite, 300—700 μ in der Länge und 100—150 μ in der Höhe. Die keuligen, unten deutlich gestielten, 70—80 ⇌ 8—10 μ grossen Asci stehen dicht parallel nebeneinander oder sind am Rande etwas gegen innen neigend. Sie sind von zahlreichen fädigen Paraphysen überragt. Die zu je acht im Ascus liegenden Ascosporen sind fädig keulig, 45—55 ⇌ 2,5—3 μ gross, hyalin und von einer schmalen Schleimhülle umgeben.

Fundort: auf überwinterten Blättern von *Lonicera quinqueloculari*s Hardw. — Indien, Kumaon, (Himalaya) Chaubattia (Almora) 17. 5. 1957.

Auf überwinterten Blättern von *Lonicera purpurascens* Hook. f. et T. fand ich einen ganz ähnlichen Pilz, der aber nur sehr junge Fruchtkörper ohne Spur von Asci zeigte. Ich stelle diesen vorläufig ebenfalls zu dieser Art:

Fundort: auf *Lonicera purpurascens* Hook. f. et T. — Indien, Kumaon, Ostgarhwal, Nanda Gini Valley, Bhuna, 2. 6. 1957.

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Studies in the Indian Phyllachoraceae.

By S. T. Tilak
(Maharashtra Association for the Cultivation of Science, Poona, India).
With two text figures.

The tarspot fungi although widespread in India, have not received any attention from the Indian Mycologists, probably because of their relatively uneconomic importance. Besides detailed ontogenic

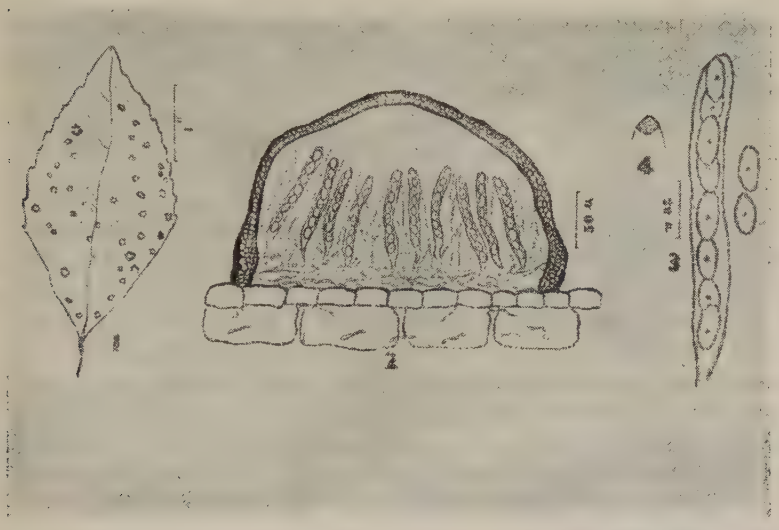

Fig. I. *Phyllachora ectophytica.* — 1. Habit. 2. Section through stroma and Perithecium. 3. Ascus and Spores. — 4. Ascus Plug.

studies, which occupy such fundamental importance in the taxonomy of the Ascomycetes, are very meagre in this group. A comprehensive investigation was, therefore, undertaken by the writer in the family *Phyllachoraceae* with special reference to its occurence in the Bombay State. During these studies the writer encountered two members of this family of unusual interest one of which was a species of *Phyllachora* with entirely superficial stromata and the other a species of *Scolecodothis,* which was a new record for India. Both of these species have been collected on hitherto unreported hosts and are presented on this and morphological grounds as new species with Latin diagnosis.

1. **Phyllachora ectophytica** Tilak sp. nov.

Maculae epiphyllae, irregulariter et laxe dispersae, plerumque solitariae, ambitu orbiculares vel ellipticae, saepe obtuse angulosae et tunc plus minusve irregulares; stromata in margine macularum tantum evoluta, circulariter disposita, superficialia, irregulariter hemisphaerica, basi lata, plana epidermidi adnata, 170—255 ⇌ 250—370 μ, omnino clausa, in maturitate probabiliter irregulariter dehiscentia; strato basali ca. 20 μ crasso, plectenchymatico, hyalino vel subhyalino; strato tegente subcarbonaceo, pseudoparenchymatico, ca. 12—15 μ crasso, e cellulis rotundato-angulosis, obscure olivaceis, vix vel leniter compressis composito; asci numerosi, cylindracei, antice obtusi, operculo praediti, postice paulatim vel abruptiuscule attenuati, breviter stipitati, 8-spori, 136—170 ⇌ 10—14 μ; sporae monostichae, oblongae vel ellipsoideae utrinque obtusae, vix vel parum attenuatae, rectae, raro inaequilaterae, continuae, hyalinae, 14—17 ⇌ 6—8.5 μ; paraphyses subnumerosae, fibrosae, distincte articulatae, postea viescentes et mucosae.

In foliis viventibus *Mesae indicae* Wall.; Mahableshwar, India, I—II. 1958, leg. S. T. Tilak.

The species of *Phyllachora* described above does not agree with the normal definition of the genus in having entirely superficial stromata and an absence of clypeus and ostiole. The family *Phyllachoraceae* was originally divided into three tribes; the *Phyllachorae,* the *Trabutieae* and the *Scirhieae* according to the location of the stromata in relation to the host tissue. This arrangement, however, is now abandoned due to the discovery of several intergrading forms within the family. According to Dr. E. Müller of Switzerland, the present collection could, therefore, be referred to the genus *Phyllachora* and described as a new species.

2. **Scolecodothis Kamatii** Tilak sp. nov.

Maculae epiphyllae, irregulariter et laxe dispersae, ambitu irregulares, raro fere orbiculares vel ellipticae, sed semper plus minusve angulosae et irregulares, leniter pustulatim elevatae, 2—7 mm diam.; stromate in mesophyllo evoluto, laxe pseudoparenchymatico, brunneo vel nigro, superne in clypeum atro-brunneum transeunte; perithecia in mesophyllo evoluta, ovoidea vel subglobosa, ostiolo papilliformi pertuso punctiformiter erumpentia, 187—225 ⇌ 119—170 μ; pariete membranaceo, ca. 15 μ crasso, pseudoparenchymatico, e cellulis irregulariter rotundato-angulosis, vix vel parum compressis, pellucide olivaceis composito, 187—225—119—170 μ; asci subnumerosi, cylindraceo-clavati vel subfusoidei, utrinque plus minusve attenuati, breviter stipitati, 8-spori, 80—88 ⇌ 12—15 μ; sporae plus minusve tristichae, anguste elongato-fusoideae, utrinque paulatim plus

minusve attenuatae, obtusae, rectae, raro inaequilaterae, continuae, hyalinae, 51—57 ⇌ 3—5.5 μ; paraphyses paucae, filiformes, mox mucosae.

The genus *Scolecodothis* originally established by Theissen and Sydow (1914) is typically phyllachoraceous due to the formation of typical tarspots, embedded stroma with clypeus and its folicular nature. So far this genus is represented by only three species

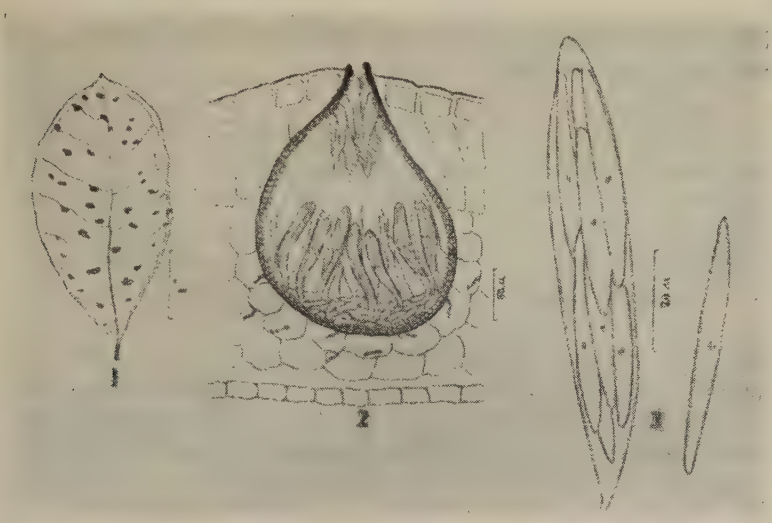

Fig. II. *Scolecodothis Kamatii.* — 1. Habit. 2. Section through stroma and Perithecium. — 3. Ascus and Spores.

mainly collected from Java and Brazil and curiously enough remained unrecorded in the Indian flora probably due to its confusion with the *Phyllachora* tarspots. The present collection thus not only constitutes a new record for India but is a new species of *Scolecodothis* on the basis of distinct morphological characters and occurrence on a new host, as is evident from the following comparative table.

Comparison between species of *Scolecodothis.*

Species	Stroma	Perithecium	Ascus	Ascospores
1. *S. castaneae*	5—20 mm.	400—100 μ	50—58 ⇌ 12	40—44 ⇌ 2.5—3
2. *S. circularis*	—	360—450 ⇌ 300—320 μ	105 ⇌ 18—22	56—66 ⇌ 4—5
3. Indian sp.	2—7 mm.	187—255 ⇌ 119—170 μ	80—88 ⇌ 12—15	51—57 ⇌ 3—5.5 μ

The species is described after Prof. M. N. Kamat in recognition of his valuable services to and deep interest in Indian Plant Pathology & Mycology.

The type specimens have been deposited in the Herbaria of the Indian Agricultural Research Institute, New Delhi, India and the Commonwealth Mycological Institute, Kew, England.

Grateful thanks are due to Prof. M. N. Kamat for his guidance and interest, to Dr. S. P. Agharkar, Director, for facilities at this Laboratory, and to Dr. Emil Müller of the Institute for Special Botany, Swiss Federal Institute of Technology, Zurich for his helpful suggestions and interest.

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Über zwei neue Ascomyceten auf Juniperus-Arten.

Von Emil Müller.

(Aus dem Institut für spezielle Botanik der Eidg. Technischen Hochschule, Zürich.)

Mit 3 Abbildungen.

In den vergangenen Jahren habe ich verschiedentlich lebendes Material von *Juniperus*-Arten, so von *Juniperus phoenicea* L. und *Juniperus sabina* L. gesammelt und darauf häufig zwei Ascomyceten gefunden, welche ich weder mit beschriebenen Arten identifizieren noch in bekannte Gattungen einreihen konnte. Daneben fand ich auch oft *Seynisiella juniperi* (Desm.) Arn., die erst kürzlich beschriebene *Xenomeris hemisphaerica* E. Müller (Müller, 1958) sowie die ebenfalls erst kürzlich beschriebene *Karschia nootkatense* Terrier (Terrier, 1952).

Auf Grund dieser Funde habe ich auch unser Material dieser zwei *Juniperus*arten im Phanerogamenherbar durchgesehen und dabei festgestellt, dass all diese erwähnten Pilze verbreitet sind. Trotzdem wurden sie — soweit sie überhaupt schon bekannt waren — nur sehr selten als Funde erwähnt.

Sowohl *Karschia nootkatense* Terrier wie die beiden hier zu besprechenden Arten verhalten sich biologisch sehr ähnlich. Die Fruchtkörper wachsen oberflächlich auf einem ebenfalls oberflächlichen, sehr unscheinbaren Myzel; irgendwelchen Einfluss auf die sie tragenden Nadeln lässt sich dabei nicht erkennen, weshalb wir sie eher als Saprophyten betrachten. Morphologisch unterscheiden sich die Pilze aber sehr deutlich.

1. **Chaetoscutula juniperi** E. Müller n. gen. et spec.

Von blossem Auge gerade noch als dunkle Punkte erkennbar, zeigen die Fruchtkörper der einen dieser Ascomyceten unter der Lupe eine deutliche Behaarung, durch welche sie sich von den übrigen, auf den Materialien wachsenden Pilzen leicht unterscheiden lassen. Der Pilz besitzt einzeln oder zu wenigen gruppenweise einem wenig umfangreichen Mycelhäutchen aufsitzende, halbkugelige Fruchtkörper ohne Mündung, aber mit schollig zerrissener Deckschicht, bitunicate, parallel nebeneinanderstehende, breit ellipsoidische Asci und zweizellige, hyaline Ascosporen.

Trotz der grossen Zahl beschriebener, oberflächlich wachsender Ascomyceten mit zweizelligen Ascosporen passt dieser Pilz in keine

mir bekannt gewordene Gattung und auch seine verwandtschaftlichen Beziehungen lassen sich nicht sehr leicht erkennen. Er nimmt eine Stellung zwischen typischen Pyrenomyceten (im Sinne von Pilzen mit geschlossenen Fruchtkörpern) und Discomyceten (im Sinne von Pilzen mit entblösster Fruchtschicht) ein, wie wir es in allen möglichen Ausbildungen bei den mit *Dothiora* Fr. verwandten Pilzen beobachten können (vgl. Müller und v. Arx, 1950; v. Arx und Müller, 1954). Seine morphologische Ausbildung erinnert auch an *Chaetothyrina* Theiss. und *Microcallis* Syd. Die Typusart der ersten Gattung, *Chaetothyrina musarum* (Speg.) Theiss. konnte ich — leider nicht nach der Originalkollektion — untersuchen; die Fruchtkörper sind schildförmig, am Rande in ein dünnes Häutchen auslaufend und die bitunicaten Asci neigen gegen die deutlich zu erkennende Mündung zusammen. *Microcallis phoebes* Syd. kann ich leider nur an Hand der von Sydow (1926) gegebenen Zeichnung beurteilen. Darnach sieht diese Art morphologisch *Chaetothyrina musarum* ähnlich, die Asci sind aber bedeutend breiter und stehen parallel; eine Mündung fehlt bei diesem Pilz. Aber auch bei ihm läuft die Deckschicht am Rande in ein Häutchen aus, ebenso ist seine Deckschicht, —nach der eindeutigen Detailzeichnung bei Sydow (1926) — kompakt. Beide Gattungstypen sind deutlich verschieden vom *Juniperus*-pilz und die betreffenden Gattungen können ausgeschlossen werden. Da ich keine weitern Gattungen gefunden habe, in die unser Pilz gehören könnte, stelle ich ihn in eine neue, welche *Chaetoscutula* genannt sei:

Chaetoscutula nov. gen.

Plagula minuta hyphiis curvatis, hyalinis, sine hyphopodiis, superficialibus composita. Ascomata solitaria vel gregaria, hemisphaerica, saetis fuscis ornata. Paries latere cellulis polyedricis parte exteriore fuscis, interiore hyalinis formatus, base hyphis hyalinis compositus. Integumentum cellulis applanatis fuscis, non cohaerentibus compositum Asci paralleli, ellipsoidei, bitunicati, 8-spori, paraphysoidibus fibratis circumdati. Sporae fusoideae vel clavatae, media vel superiore parte septatae, hyalinae.

Oberflächliches Myzel aus gekrümmten, septierten, hellbraunen bis hyalinen Hyphen ohne Hyphopodien, Haustorien oder Appressorien. Fruchtkörper einzeln oder zu wenigen gruppenweise aufsitzend, halbkugelig oder undeutlich ellipsoidisch, ohne Mündung, aussen mit dunklen, knorrigen, septierten Borsten besetzt. Fruchtkörperwand nur seitlich gut ausgebildet, hier aus polyedrischen, zu äusserst dunkeln, derbwandigen, innen hyalinen, zartwandigen Zellen aufgebaut. Basal mit mehr oder weniger lockerm, aus subhyalinen bis hyalinen Hyphen zusammengesetztem Geflecht dem Substrat aufsitzend und oben mit dunklen, plattenförmigen, nicht zusammen-

hängenden Zellen eine Deckschicht bildend. Asci parallel nebeneinander stehend, wenig zahlreich, derb- und doppelwandig, breit ellipsoidisch, achtsporig, von fädigen Paraphysoiden umgeben, welche über dem Hymenium in ein lockeres Geflecht aus hyalinen, zartwandigen Zellen übergehen. Ascosporen länglich-keulig oder spindelförmig, in oder etwas über der Mitte septiert, hyalin, sich aber ausserhalb der Asci später bräunlich färbend.

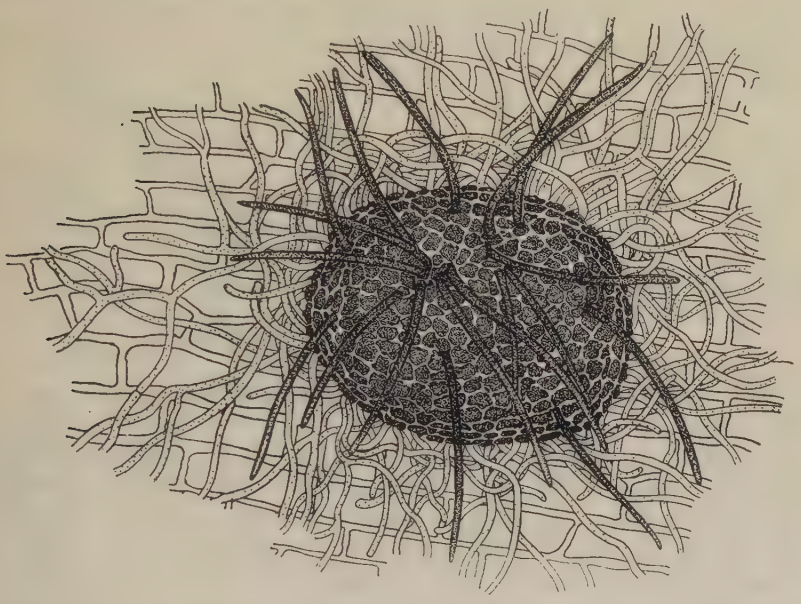

Abbildung 1. Fruchtkörper von *Chaetoscutula juniperi* mit Hyphenfilz von oben gesehen. Vergr. 250 ×.

Chaetoscutula juniperi nov. spec.

Plagulae ca. 1 mm diam., hyphiis curvatis, subfuscis vel hyalinis, 4—5 μ crassitudine, exhyphopodiis, superficialibus composita. Ascomata solitaria vel gregaria, 150—250 μ diam. hemisphaerica, saetis fuscis, 50—80 μ longitudine et base 4—6 μ crassitudine, ornata. Paries latere cellulis polyedricis, 4—7 μ diam. exteriore parte fuscis, interiore hyaliniis formatus; plagula hyphis hyalinis substrato coniuncta; integumentum cellulis applanatis, fuscis, non coharentibus compositum. Asci paralleli, ellipsoidei, 50—60 ⇌ 18—24 μ, bitunicati, 8-spori; paraphysoides cellulatae. Sporae cylindraceo-clavatae, supra medium septatae, 22—27 ⇌ 7—8,5 μ, hyalinae, sed asco eiectae subfuscae.

Hab. in foliis vivis *Juniperi phoeniceae* L. — Gallia meridionale, in montibus Alpibus maritimes, Georges du Verdon, supra pontem Artuby 23. 6. 1956.

Die 150—250 μ grossen, einzeln oder zu wenigen gruppenweise beisammen stehenden, selten auch miteinander seitlich verwachsenen Fruchtkörper sitzen oberflächlich auf einem bis 1 mm grossen, rundlichen Myzel aus gekrümmten, 4—5 μ dicken, bräunlichen, am Rande hyalinen, wenig verzweigten Hyphen ohne Hyphopodien, Haustorien oder Apressorien. Sie sind halbkugelig, oft in einer Richtung etwas länger, oben flach und unten dem Substrat breit aufsitzend. Aussen sind sie mit dunklen, zum Teil zugespritzten, zum Teil stumpf

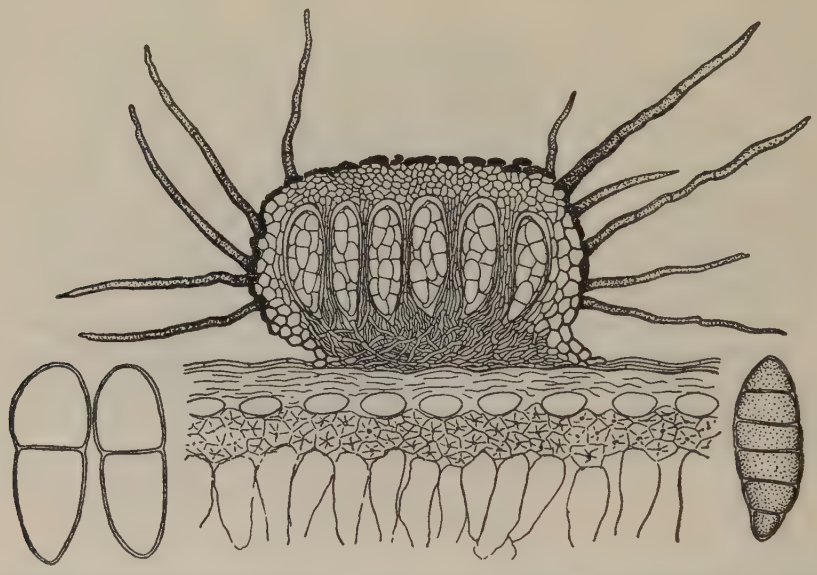

Abbildung 2. *Chaetoscutula juniperi*, links: Ascosporen. Vergr. 1000×; in der Mitte: Schnitt durch einen Fruchtkörper. Vergr. 250×; rechts: Konidie, Vergr. 1000×.

endenden, 50—80 μ langen und an der Basis 4—6 μ dicken, mehr oder wenig knorrig gekrümmten oft auch gegen die Enden zu etwas helleren Borsten besetzt. Die Fruchtkörperwand ist relativ dünn und nur seitlich typisch ausgebildet. Hier besteht sie aus polyedrischen, 4—7 μ grossen, aussen dunkeln und derbwandigen, innen hyalinen und zartwandigen Zellen, welche sich gegen die Basis hin schwach strecken. Basal sitzen die Fruchtkörper mit einem hyalinen, aus mehr oder weniger locker miteinander verwobenen Hyphen bestehenden Geflecht dem Substrat auf. Die Deckschicht besteht aus einer Lage von plattenförmigen, nicht zusammenhängenden, dunkeln, im Umriss unregelmässigen Zellen. Eine Mündung fehlt.

Die breit ellipsoidischen, zuweilen auch keulenförmigen oder unten sackartig erweiterten, dick- und doppelwandigen, 50—60 ⇌ 18—24 μ grossen Asci stehen in geringer Zahl parallel nebeneinander

und sind durch zellig-faseriges paraphysoides Geflecht voneinander getrennt. Dieses geht über dem Hymenium in ein aus zartwandigen, 4—6 μ grossen, hyalinen Zellen bestehendes Geflecht über. Die Asci sitzen unmittelbar dem hyphig aufgebauten, lockern Basalgeflecht auf und sie enthalten je acht, zylinderisch-keulige, zuweilen unten auch deutlich zugespitzte, über der Mitte septierte, 22—27 ⇌ 7—8.5 μ grosse, hyaline Sporen, welche sich später — erst ausserhalb der Asci — bräunlich färben.

Spärlich, aber an den meisten Fruchtkörpern zu beobachten, sitzen diesen aussen noch Konidien an kurzen Stielen auf. Diese sind ellipsoidisch, 18—23 ⇌ 6—8 μ gross, durch 3—5 Querwände septiert und hell bräunlich gefärbt.

Aus den mir zur Verfügung stehenden Belegen kommt der Pilz sowohl auf *Juniperus phoenicea* L. wie auch auf *Juniperus sabina* L. vor. Im botanischen Garten in München habe ich ihn auch auf *Juniperus chinensis* L. gefunden, sodass anzunehmen ist, er könne eine ganze Anzahl verwandter Arten besiedeln. Fundortsbelege stehen mir aus Frankreich, Italien, der Schweiz und Deutschland zur Verfügung und zwar folgt der Pilz den Wirten überall hin.

2. **Pododimeria gallica** nov. gen. et spec.

Der zweite zur Diskussion stehende Pilz wächst gewöhnlich in Gesellschaft des oben beschriebenen, besiedelt aber meist eher die äussern Zweigspitzen. Makroskopisch lässt er sich nicht von *Chaetoscutula juniperi* unterscheiden, hingegen kennt man ihn unter der Lupe leicht an seinen kahlen, kugeligen, auf einem Stiele sitzenden Fruchtkörper. Ebenso lassen sich die beiden Pilze auch an Hand von Quetschpräparaten mikroskopisch leicht auseinanderhalten. Sie gehören auch ganz verschiedenen Entwicklungsreihen an.

Diese zweite Form zeichnet sich aus durch kugelige, dunkelbraune, kahle Fruchtkörper, welche einzeln auf stromatischen, aus den Zentren der Hyphenrasen durch Verdichtung des Myzels geformten und senkrecht emporwachsenden Stielen sitzen, durch sackförmige Asci und durch keulige, über der Mitte septierte, braune Ascosporen.

Früher hätten die Autoren einen solchen Pilz zu den Capnodien gestellt; nach heutigen Auffassungen haben aber derartige Pilze nichts mit *Capnodium* zu tun. Die nächsten Verwandten würde ich eher unter den Dimerieen suchen, unter welchen allerdings keine ähnliche Form bekannt ist.

Pododimeria nov. gen.

Plagula minuta, hyphis rectis, hyalinis vel subfuscis, sine hyphopodis composita ex parte centrale hyphis dense fiscinatis hypostroma erecta. Hypostroma base hyphis fuscis apice cellulis rotundatis,

brunneis composita, parte superiore perithecia solitaria. Perithecia globosa, apice plus minusve ostiolata, paries perithecii cellulis polyedricis, fuscis compositus. Asci non numerosi, cylindracei vel ellipsoidei, bitunicati, 8-spori. Sporae cylindraceae vel clavatae, fuscae, media vel superiore parte septatae.

Abbildung 3. *Pododimeria gallica.* Hypostroma mit Rasen, oberer Teil mit Fruchtkörper aufgeschnitten, Vergr. 250×, rechts Ascosporen, Vergr. 1000×.

Pilze mit kleinen Myzelrasen aus bräunlichen oder subhyalinen Hyphen ohne Hyphopodien, Haustorien oder Appressorien vollständig oberflächlich wachsend. Hypostromata einzeln aus den Rasenzentren durch Zusammentreten der Hyphen gebildet, senkrecht oder meist schwach schräg emporgerichtet, im untern Teil aus braunen Hyphen, im obern Teil aus ziemlich derbwandigen, braunen, polyedrischen Zellen aufgebaut. Fruchtkörper einzeln den Hypostromata kopfförmig aufgewachsen, kugelig, mit papillenförmiger Mündung. Fruchtkörperwand aus polyedrischen, derbwandigen, braunen Zellen aufgebaut, ziemlich dick. Asci nicht zahlreich, zylindrisch oder breit ellipsoidisch, derb- und doppelwandig (bitunicat), achtsporig. Sporen

zylinderisch-ellipsoidisch oder keulig, dunkelbraun, zweizellig mit mittlerem oder etwas über der Mitte angeordnetem Septum. Paraphysoiden fädig-zellig.

Pododimeria gallica nov. spec.

Plagula ca. ½ mm diam., hyphis rectis, 3—4 μ latitudine, hyalinis vel subfuscis, sine hyphopodiis composita. Hypostroma erecta, in parte centralibus plagulae nascens, base hyphis fuscis, apice cellulis rotundatis fuscis composita, 80—130 μ altitudine; Perithecia parte superiore hypostromae sedentia, globosa, 100—150 μ diam., ostiolata. Paries perithecii 8—15 μ crassitudine, cellulis 6—10 μ diam. polyedricis, fuscis compositus. Asci non numerosi, ellipsoidei, bitunicati, 75—85 ⇌ 20—25 μ, 8-spori. Sporae cylindraceo-clavatae, supra medium septatae, rectae vel curvatae, 24—27 ⇌ 9—11 μ, fuscae. Paraphysoides fibrosae, cellulatae.

Hab. ad folia viva *Juniperi phoeniceae* L. — Gallia meridionale, in montibus Alpibus maritimes. — Georges du Verdon, supra pontem Artuby, 23. 6. 1956.

Der oberflächlich auf den lebenden Teilen seiner Wirtspflanzen wachsende Pilz bildet zunächst kleine, ca. ½ mm grosse Räschen aus mehr oder weniger eng ineinander verflochtenen, bräunlichen, gegen den Rand zu subhyalinen, mehr oder weniger reichlich verzweigten, 3—4 μ dicken Hyphen. Im Zentrum der Rasen verdichtet sich das Geflecht, richtet sich empor und bildet je einen 80—130 μ hohen und 50—80 μ breiten, stielartigen, aufrechten, senkrecht oder meist etwas schräg zur Substratoberfläche aufsteigenden hypostromatischen Fuss. An der Basis setzt sich dieser aus hyphigen, bräunlichen, oben aus polyedrischen, ziemlich derbwandigen Zellen zusammen. Die Perithecien sind einzeln diesen Hypostromata kopfartig aufgesetzt; sie sind kugelig, 100—150 μ gross und dunkelbraun. Ihre Wand ist 8—15 μ dick und besteht aus ebenfalls derbwandigen, braunen, polyedrischen, 6—10 μ grossen Zellen. Am Scheitel befindet sich je eine papillenförmige, von einem engen Kanal durchbohrte Mündung.

Die wenigen, breit ellipsoidischen, derb- und doppelwandigen Asci sind 75—85 ⇌ 20—25 μ gross und enthalten je acht Sporen. Diese sind zylindrisch-keulig, gerade oder etwas gekrümmt, zunächst olivenbraun, später dunkelbraun, meist etwas über der Mitte septiert und schwach eingeschnürt, 24—27 ⇌ 9—11 μ gross. Die Paraphysoiden sind fädig zellig und gehen über den Asci in ein kleinzelliges, hyalines Gewebe über.

In Bezug auf Verbreitung und Wirtswahl gilt für *Pododimeria gallica* fast dasselbe wie für *Chaetoscutula juniperi*. Er tritt sowohl auf *Juniperus phoenicea* L. wie auf *Juniperus sabina* L. auf, scheint aber immerhin auf den betreffenden Materialien spärlicher zu

sein. Fundortsbelege stammen aus Frankreich, Italien und der Schweiz.

Der Pilz wurde auch isoliert und in Reinkultur auf Malzagar beobachtet. Er wächst äusserst langsam und bildet nach zwei bis drei Monaten ein kleines Polster von ca. 1 cm Durchmesser, zusammengesetzt aus bräunlichen, zum Teil spiralig gekrümmten, septierten Hyphen. Oft sind die einzelnen Hyphenglieder an den Septen etwas schmäler. Konidien werden in Reinkultur keine gebildet. Leider gelang es nicht, auch *Chaetoscutula juniperi* in Kultur zu beobachten.

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A new Species of Microcyclus from India.

By S. T. Tilak
(Maharashtra Association for the Cultivation of Science, Poona, India).
With one text figure.

During the course of his studies on the fungus genus *Phyllachora* the tar-spot pathogen, the writer collected a new fungus closely associated with the typical tar-spots on *Actinodaphne hookeri* Meissn. from Mahabaleshwar, India. On closer examination in sections, the fungus was identified as a species of *Microcyclus*. This genus has so far remained unrepresented in the Indian Flora. It may have escaped notice because of the scattered inconspicuous infection spots produced on the host associated with the prominent tar-spots of *Phyllachora actinodaphnes* Uppal et al. These considerations aroused interest and led to detailed observations on this fungus, which are briefly presented here.

1. Habit. — 2. Section of Stroma showing arrangement of locules. — 3. Ascus and spores.

The observations were made in permanent sections stained with Haidenhain's iron alum haematoxylin, counterstained with light green in clove oil. A critical examination of the literature showed that the Dothidiaceous genus *Microcyclus* first established by Saccardo (1904), is represented by only a few species, mostly obtained from South America as described by Müller and Sanwal (1954). The

present fungus showed closer affinities with *M. angolensis* Sacc et Syd. A comparison between this type species and the Indian representative is presented in the following table:

Species	Stroma	Locules	Asci	Ascospores
M. angolensis	200—400	60— 80 ⇌ 70—100 μ	50—60 12—16 μ	14—18 4— 5 μ
New species	150—275	50— 90 45— 60 μ	30—45 7— 9 μ	10—14 3— 4 μ

The Indian species of *Microcyclus* is distinct in all respects from the type and from previously described species and has much smaller dimensions. Besides it is collected on a hitherto unreported host. The fungus, therefore, is presented as a new species of *Microcyclus* with Latin diagnosis.

Microcyclus indicus Tilak sp. nov.

Maculae laxe dispersae, indistinctae, plerumque hypophyllae, irregulares, brunneae vel nigrescentes; stromata subdense dispersa, crasse pulvinata, loculis plus minusve prominulis minute verrucosa, ambitu plus minusve orbicularia, sed plerumque irregularia, 150—275 μ diam., contextu pseudoparenchymatico, e cellulis irregulariter rotundato-angulosis composito, in centro subito in hypostroma breviter cylindraceum, epidermidem perforantem, mesophyllo plus minusve innatum prosenchymaticum, e cellulis distincte protractis, in series parallelas, verticaliter ordinatas compositum contractum; loculi pauci, plerumque 3—6 in quoque stromate, ovoidei vel subglobosi, in stromatis superficie poro minuto aperti, 50—90 ⇌ 45—60 μ; asci clavato-cylindracei vel subfusoidei, utrinque vel postice tantum leniter attenuati, antice obtusi, breviter stipitati, 8-spori, 30—45 ⇌ 7—9 μ; sporae plus minusve distichae, subfusoideae, utrinque obtusae, leniter attenuatae, rectae, raro inaequilaterae, medio septatae, plus minusve constrictae, hyalinae, 10—14 ⇌ 3—4 μ; paraphysoides sat numerosae, cellulosae, e stromate intertheciali pseudoparenchymatico oriundae.

In foliis *Actinodaphnes hookeri* Meissn., Mahabaleshwar, India, leg. S. T. Tilak II.—III. 1958.

The fungus, besides being a new species collected on a hitherto unreported host, is a new addition to the Indian genera.

The type specimens have been deposited in the herbaria of the Commonwealth Mycological Institute, Kew, England, and Indian Agricultural Research Institute, New Delhi, India.

The writer is grateful to Prof. M. N. Kamat for his guidance and interest during the course of these studies, to Dr. S. P. Agharkar, Director, for facilities offered at this Laboratory, and Dr. M. J. Thirumalachar for access to literature.

Literature.

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2. Saccardo, P. A. 1904. Sylloge Fungorum. Vol. **17**, pp. 844.

Über einige für die Alpen neue Ascomyceten.

Von Emil Müller.

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Mit 4 Abbildungen.

1. Arnaudiella ribis.

Die gegenwärtige Situation in der Pilzsystematik bedingt zuweilen, dass Gattungen, welche während langen Jahren in einer bestimmten Weise umschrieben waren, auf einmal ganz anders charakterisiert werden müssen, weil die Typusart gar nicht der eingebürgerten Konzeption entspricht. Es werden dann die übrigen Arten, welche auf Grund der gebräuchlichen Auffassung über die Gattung bei dieser eingereiht worden sind, systematisch heimatlos bis der ganze Formenkreis monographisch bearbeitet wird.

Eine solche Lage besteht gegenwärtig innerhalb der Gattung *Seynesia* Sacc. Diese galt lange Zeit als Parallelgattung zu *Microthyrium* Desm., wobei sie sich durch die gefärbten Ascosporen von dieser unterschieden hätte. Auf dieser Auffassung gründend hat auch Theissen (1913/14) die Gattung revidiert und bis heute werden immer noch entsprechende Formen zur Gattung gestellt. Nun hat aber Petrak (1927) schon vor längerer Zeit festgestellt, dass die Typusart der Gattung, nämlich *Seynesia erumpens* (Berk. et Curt.) Petr. [= *Seynesia nobile* (Welw. et Curr.) Sacc.] ein ganz anders gebauter Pilz ist, der mit den *Microthyriaceae* nichts zu tun hat und zu den *Sphaeriales* gehört. Er führte daher damals für die *Microthyrium*-artigen, mit gefärbten Sporen versehenen Pilze die neue Gattung *Arnaudiella* ein, wobei er ausdrücklich *Arnaudiella caronae* (Pass.) Petr. als Typus erwähnt.

v. Arx und Müller (1954) haben für *Seynesia* die Sachlage bestätigt und noch weiterhin festgestellt, dass *Seynesia* Sacc. auch die selbe Typusart besitzt wie *Pemphidium* Mont. und deshalb zu dieser synonym ist. *Arnaudiella* Petr. besteht also zu Recht.

Die Typusart von *Arnaudiella* Petr. ist ein nicht seltener Pilz, welcher auf lebenden und abgestorbenen Zweigen strauchiger Leguminosen wie *Sarothamnus, Spartium, Genista* wächst. Bis heute gilt *Seynesia caronae* Pass. als ältester Name. Wie nun aber das in Fungi Rhenani Nr. 2247 ausgegebene Material von *Didymosphaeria genistae* Fuck. zeigt, ist der Pilz schon viel früher unter diesem Namen beschrieben worden. Sowohl Fuckel (1869) wie auch Winter

(1887) erwähnten in ihren Beschreibungen ausdrücklich die niedergedrückten Fruchtkörper, welche nach Winter (1887) auch am Rande strahlig ausfransen. Das Epitheton *„genistae"* hat demnach die Priorität vor *„caronae"*, weshalb der Pilz nun als *Arnaudiella genistae* (Fuck.) E. Müller geführt werden sollte. Seine Synonymie stellt sich gegenwärtig folgendermassen dar:

Arnaudiella genistae (Fuck.) E. Müller comb. nov.
Synonyme: *Didymosphaeria genistae* Fuck. — Fungi Rhenani nr. 2247 (1868) — Symb. Myc. 141 (1869).
Seynesia caronae Pass. — Diagnosi fungi novi. — Rend. R. Accad. Lincei 4. ser. **4**, n. 44 (1888).
Arnaudiella caronae Petr. Ann. Myc. **25**, 339 (1927).
Seynesia pulchella B. R. et S. — Syll. Fung. 9, 1066 (1891).

Auf einer Exkursion im Sommer 1956 in die Bündner Alpen habe ich nun einen Pilz auf *Ribes petraeum* Wulfen gefunden, welcher zu *Arnaudiella genistae* eine grosse Ähnlichkeit zeigt, sich aber durch das subkutikuläre Wachstum, durch den nicht so streng radiären Aufbau der Deckschicht und durch den Besiz eines ziemlich üppig entwickelten subkutikulären Mycels von dieser unterscheidet. In der Fruchtschicht stimmen aber beide Pilze gut überein. Der neue Pilz sei nachstehend beschrieben:

Arnaudiella ribis E. Müller nov. spec.

Ascomata dispersa, sub cuticula nascentia, atra, depressa, orbicularia vel leniter elongata, 130—200 μ diam. mycelio subcuticulare subhyalino, sine hyphopodie circumdata; paries superior hyphis atrobrunneis, 3—7 μ longitudine, 2.5—3 μ crassitudine, ordinibus irregulariter radiantibus compositus, apice ostiolo orbiculare erumpente, inferior paries hyalinis hyphis tenuibus compositus. Asci late cylindracei rare clavati vel saccati, 45—55 ⇌ 12—14 μ, bitunicati, paraphysoidibus hyalinibus circumdati. Sporae plusminusve distichae, clavatae, medio septatae, olivaceo-fuscae, 12—14 ⇌ 4.5—5.5 μ.

Hab. in ramis *Ribis petraei* Wulfen — Helvetia, alpibus raetibus, Bergün, Val Tuors, Chaclavuot, 26. 7. 1956.

Der Pilz wächst mit zerstreut stehenden, im Umriss meist rundlichen, seltener in der Substratrichtung etwas gestreckten, deutlich niedergedrückt-schildförmigen Fruchtkörpern unter der Kutikuta des Wirtes. Am Scheitel besitzt er einen rundlichen, 15—20 μ weiten Mündungsporus. Die Deckschicht besteht aus eng ineinander verschlungenen, mit opak-schwarzbraunen Wänden versehenen, 2—3.5 μ breiten und 3—7 μ langen Hyphengliedern, deren Anordnung nicht streng radiär ist, deren bevorzugte Ordnung, besonders gegen den Rand hin, aber doch die radiäre ist. Im Schnitt erkennt man zwei bis vier übereinander liegende Zellschichten, von denen die inneren aus helleren, zartwandigern und mehr oder weniger isodiametrischen Zellen bestehen. Gegen die Basis trennen sich die inneren, hyalinen

bis subhyalinen Zellschichten von der seitlich unter der Kutikula weiterlaufenden, sich aber bald in ein Geflecht aus hell-olivenbräunlichen, knorrigen, vielfach verästelten Hyphen auflösenden Deckschicht. An der Basis wird die Fruchtkörperwand rasch dünner und besteht zur Hauptsache nur noch aus einer einzigen Schicht hyaliner, zartwandiger, 3—5 μ grosser Zellen.

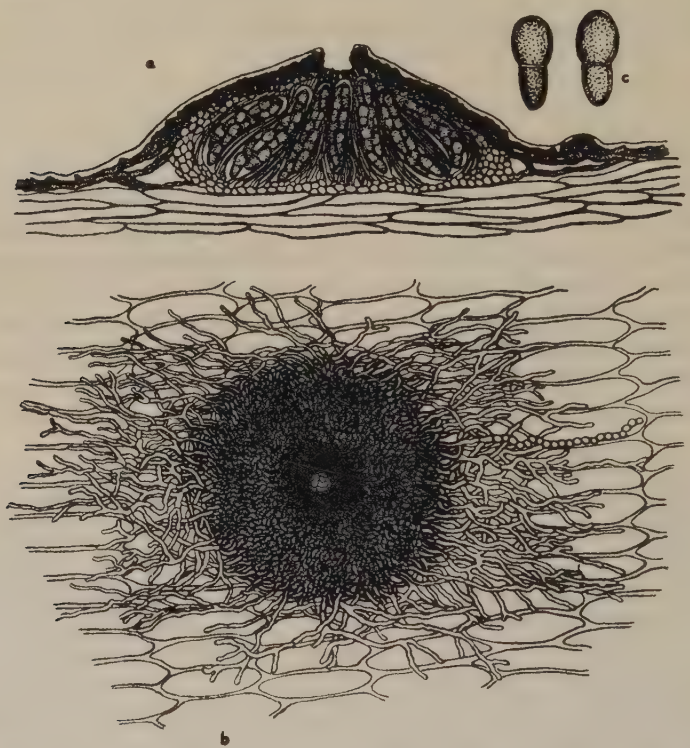

Abbildung 1. *Arnaudiella ribis.* a) Schnitt durch einen Fruchtkörper; b) Fruchtkörper von oben gesehen, Vergr. je 250 ×; c) Ascosporen. Vergr. 1000 ×.

Die ziemlich breit zylindrischen, seltener etwas keuligen oder sackförmigen, 45—55 ⇌ 12—14 μ grossen, doppel- und ziemlich derbwandigen Asci sind unten in einen knopfigen Stiel zusammengezogen; sie sind der ganzen Basis entlang aufgewachsen und neigen gegen den Mündungsporus zusammen. Zahlreiche breit-fädige Paraphysoiden umgeben sie. Die zu je acht, meist mehr oder weniger deutlich zweireihig im Ascus angeordneten Ascosporen sind keulig, beidendig breit abgerundet, in der Mitte septiert und deutlich eingeschnürt, 12—14 ⇌ 4.5—5.5 μ gross. Sie bleiben lange hyalin, färben sich aber dann olivenbraun an und erhalten auch ein zwar schmales, trotzdem aber deutlich wahrnehmbares Epispor.

2. Wettsteinina macrotheca.

Kürzlich fand ich auf Material von *Carex parviflora* Host. (= *Carex nigra* Bell.), das ich schon vor längerer Zeit in den Alpen gesammelt hatte, einen Ascomyceten, der sich identisch erwies mit dem von Rostrup (1888) auf *Carex hyperborea* Drej. und *Carex rigida* Good. in Grönland gefundenen und als *Metasphaeria macrotheca* eingereihten Pilz. Berlese (1895) hat den Pilz ebenfalls untersucht und dazu bemerkt, dieser neige in Bezug auf Asci und Sporen wohl zu *Sphaerulina* Sacc. hin, sei aber wegen den deutlichen Paraphysen bei *Metasphaeria* Sacc. am rechten Ort eingereiht. Lind (1928) stellte ihn zu *Massaria*.

Der nunmehrige alpine Fund scheint der erste ausserhalb der Arktis zu sein (arktische Funde zusammengestellt bei Lind, 1934); es kann daraus auf eine grössere Verbreitung geschlossen werden. Dabei ergab nun die Untersuchung des Pilzes, dass er unmöglich zu *Metasphaeria* Sacc. gestellt werden darf und zwar auch dann nicht, wenn dieser Gattung eine sichere Umschreibung gegeben werden könnte. Es handelt sich vielmehr um eine Art aus jener Gruppe von Pilzen, welche v. Höhnel (1907) den Anstoss zur Einführung seiner — heute wieder vereinigten — Gattungen *Wettsteinina* und *Pseudosphaeria* gegeben haben. Der Pilz sollte deshalb als *Wettsteinina* eingereiht werden.

Die bisher zur Gattung *Wettsteinina* gestellten Pilze sind dank mehrerer Bearbeitungen relativ gut bekannt, von diesen ist *Metasphaeria macrotheca* recht gut unterscheidbar. Fruchtkörper und deren Fruchtschicht geben zwar kaum Anhaltspunkte für Unterschiede, doch lässt er sich durch die Sporen von den übrigen Arten trennen. Diese sind breit zylindrisch, beidendig breit abgerundet, in der Mitte leicht eingeschnürt und hier mit einer primären und überdies auch noch mit zwei sekundären Septen versehen, welche anfänglich durch ganz leichte Einschnürungen angedeutet werden. Rundum sind sie von einer Schleimhülle umgeben, welche seitlich nur sehr dünn ist, sich über den Enden aber deutlich verdickt und überdies über der zweiten Sporenzelle eine kragenartige Erweiterung aufweist. Der Pilz lässt sich demnach folgendermassen beschreiben:

Wettsteinina macrotheca (Rostr.) E. Müller comb. nov.

Synonyme: *Metasphaeria macrotheca* Rostr. — Medd, om Grønland **3**, 561 (1888).

Massaria macrotheca Lind. — Skrifter om Svalbard og Ishavet Nr. 13, 31 (1928).

Matrix: auf dürren Blättern von *Carex* ssp. (Arktis, Alpen).

Der Pilz besitzt einzelstehende und zerstreute, kugelige oder meist birnförmige, 150—200 μ grosse, dem Substrat vollständig eingesenkte Fruchtkörper. Diese besitzen am Scheitel eine atypische Mündung, welche lange von einem hyalinen Gewebe aus zartwandigen, rundlichen, 5—8 μ grossen Zellen verschlossen bleibt und sich

erst später unregelmässig durch Ausbröckeln öffnet. Die Fruchtkörperwand ist derb, 25—35 μ dick und besteht aus mehreren Lagen von 10—14 μ grossen, aussen rundlichen, derbwandigen und dunkelbraunen, gegen innen mehr gestreckten, weniger derbwandigen, helleren und zuinnerst endlich zartwandigen und hyalinen Zellen; sie geht zuinnerst auch ohne scharfe Grenze in das kleinzellige paraphysoide Gewebe über.

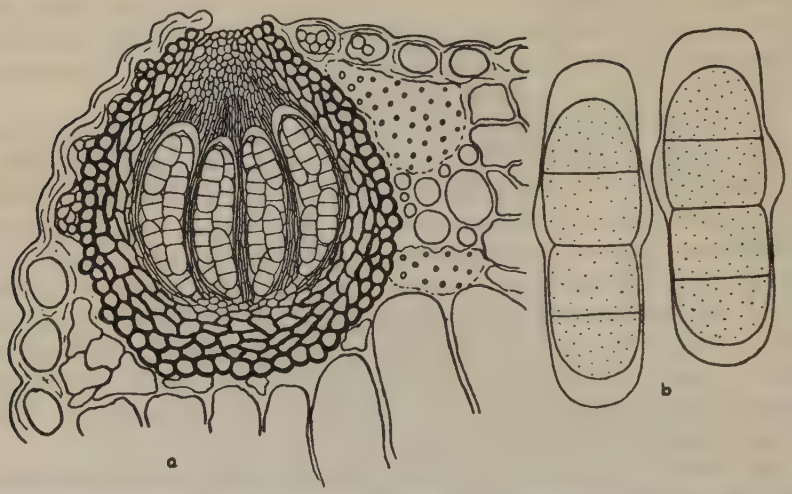

Abbildung 2. *Wettsteinina macrotheca.* a) Fruchtkörper im Schnitt. Vergr. 250 ×. b) Ascosporen. Vergr. 1000 ×.

Die breit ellipsoidischen, derb- und doppelwandigen, 80—120 ⇌ 24—34 μ grossen Asci sitzen zu wenigen einem kleinzelligen Basalpolster auf; sie sind achtsporig und von einem zellig-faserigen, hyalinen, paraphysoiden Gewebe umgeben, welches sich über ihnen in ein aus kleinen rundlichen Zellen bestehendes Gewebe umformt. Die Ascosporen sind 30—38 ⇌ 12—14 μ gross, zylindrisch, beidendig breit abgerundet, in der Mitte schwach eingeschnürt und mit einer primären, später überdies mit zwei weiteren sekundären Querwänden versehen und in den Asci bleibend hyalin. Umgeben ist jede Spore von einer charakteristisch gebauten Schleimhülle. Diese ist den Sporenseiten entlang nur dünn, sie reicht aber deutlich über die Enden hinaus und über der zweiten Zelle von oben ist sie rund um die Spore kragenartig erweitert.

Fundort: auf dürren Blättern von *Carex parviflora* Host. — Kt. Graubünden, Val Tuors (Bergün), Vo, 21. 7. 1949!

3. Leptosphaerulina vitrea.

Im Gegensatz zur vorigen Art, die bis anhin nur aus der Arktis angegeben war, hat *Leptosphaerulina vitrea* (Rostr.) Woron. eine weitere Verbreitung. Ursprünglich ebenfalls aus Grönland beschrie-

ben (Rostrup, 1891) wurde sie später auch in Island, Norwegen (Telemarken), Schottland und im Kaukasus aufgefunden (vgl. Lind, 1934). Ein alpines Vorkommen war deshalb zu erwarten und die nunmehrigen Funde aus den Alpen überraschen keineswegs. Immerhin handelt es sich um einen wenig beachteten Pilz, welcher ausserdem wegen seiner systematischen Stellung zu einigen Betrachtungen herausfordert.

Rostrup (1891) stellte den Pilz zu *Pleospora* Rabenh. Zweifellos gehört er in die nähere Verwandtschaft dieser Gattung, unterscheidet sich aber durch die wenigen, breit ellipsoidischen Asci und durch die lange hyalin bleibenden, sich aber später bräunlich anfärbenden Sporen, sowie auch durch die relativ kleinen Fruchtkörper von den typischen Vertretern dieser Gattung. Müller (1951) hat für derartige Pilze die *Pleospora*-Untergattung *Pseudopleella* eingeführt, während Wehmeyer (1955, 1957) den Typus dieser Untergattung und damit auch die Untergattung zu *Pseudoplea* v. Höhn. stellte. Nun hat aber schon McAlpine (1902) für derartige Pilze eine eigene Gattung begründet, welche er *Leptosphaerulina* nannte und als *Pleosphaerulina* mit zuletzt bräunlichen Sporen umschrieb. Typus seiner neuen Gattung ist *Leptosphaerulina australis McAlpine,* die er mit einer zwar kurzen, aber eindeutigen Beschreibung ausstattete und in den wesentlichen Merkmalen auch zeichnerisch darstellte. Darnach unterscheidet sich der Pilz von *Pleospora Gaeumanni* E. Müller [= *Pseudoplea Gaemanni* (E. Müller) Wehm.], dem Typus der Untergattung *Pseudopleella* E. Müll. im wesentlichen nur durch die etwas kleineren, aber durch 5 Querwände unterteilte Sporen, während *Pleospora Gaeumanni* nur 4 Querwände besitzt. Will man deshalb derartige Pilze in eine von *Pleospora* verschiedene Gattung stellen — was sich ohne weiters begründen lässt — so darf diese Gattung nicht die später beschriebene *Pseudoplea* sein, sondern es muss die McAlpine'sche Gattung *Leptosphaerulina* Berücksichtigung finden. Die Einführung der Kombination *Leptosphaerulina vitrea* durch Woronichin (1927) erfolgte deshalb durchaus zu Recht.

Die bis heute angegebenen Funde beschränken sich auf Arten aus den Gattungen *Potentilla* und *Alchemilla.* Das Originalmaterial von *Pleospora vitrea* stammt von *Potentilla maculata* Pourr. Woronichin (1927) fand den Pilz im Kaukasus auf *Potentilla rupstris* L, während Lind als weitern Wirt *Alchemilla alpina* L. angibt. Die mir vorliegenden Funde sind ebenfalls auf *Alchemilla alpina* L, *Potentilla erecta* (L) Hampe und einer nicht näher bestimmbaren weitern *Potentilla*art.

Leptosphaerulina vitrea (Rostr.) Woron.

Synonyme: *Pleospora vitrea* Rostr. — Medd. om Grønland **3**, 620 (1891).

Catharina vitrea Sacc. — Syll. Fung.

Pleosphaerulina vitrea Berl. — Icones Fungorum **2**.

Leptosphaerulina vitrea Woron. — Trav. Bot. Acad. Sc. U.S.S.R. **21**, 123 (1927).

Matrix: auf abgestorbenen Blättern von *Alchemilla* und *Potentilla* (Arktis und Subarktis, Alpen, Kaukasus).

Die in ziemlich unregelmässigen, meist aber ziemlich dichten Herden subkutikulär wachsenden Fruchtkörper sind in Form und Grösse stark variabel. Neben kugeligen Formen beobachtet man birnförmige oder flaschenartig verlängerte Fruchtkörper mit 50—

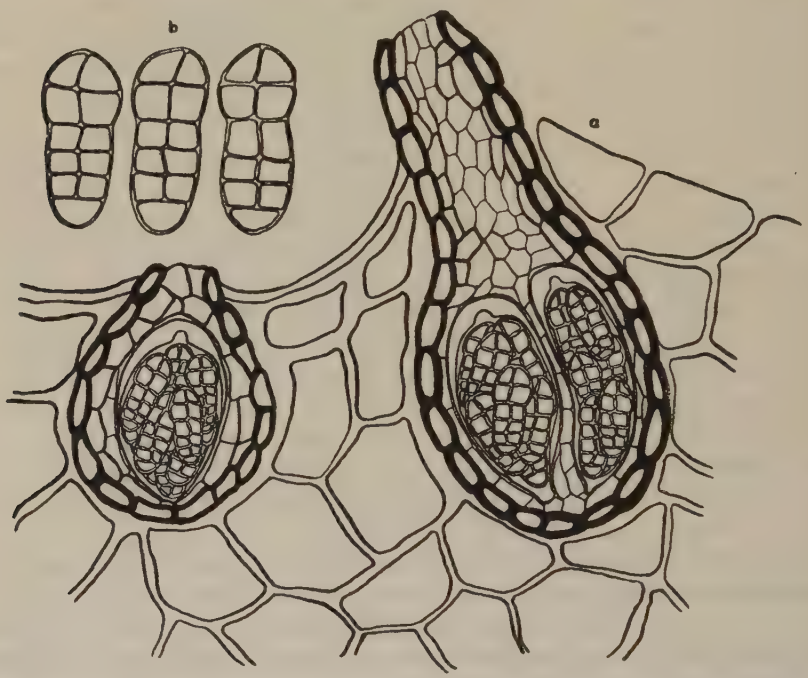

Abbildung 3. *Leptosphaerulina vitrea.* a) Schnitt durch 2 Fruchtkörper. Vergr. 500×. b) Sporen. Vergr. 1000×.

80 μ Durchmesser und 60—150 μ Höhe. Die scheitelständige Mündung ist oft flach, meist aber deutlich vorragend. Rundum sind die Fruchtkörper auch von bräunlichem Geflecht umgeben. Die Fruchtkörperwand besteht meist nur aus einer Schicht von schwach zusammengepressten, nicht sehr derbwandigen, bräunlichen Zellen. Die wenig zahlreichen (meist nur 1—5) Asci sind derb- und doppelwandig mit ausgeprägt verdickter Scheitelpartie, breit ellipsoidisch oder eiförmig, 40—70 μ lang und 25—30 μ breit und achtsporig, von faserigem paraphysoiden Geflecht umgeben. Die regellos im Ascus liegenden Ascosporen sind ellipsoidisch-keulig, mit 5 Quersepten und einer meist die unterste Zelle nicht erfassenden Längswand versehen, an der zweiten Querwand eingeschnürt und darüber kopfig angeschwol-

len, 21—26 × 9.5—11 μ gross, anfangs hyalin, sich später bräunlich färbend.

Untersuchtes Material: auf *Alchemilla alpina* L. — Südwestgrönland, Julianahaab-Distrikt, Ins. Unartop, 22. 8. 1936, leg. C. E. Wegmann, (ex herb. Phan. E.T.H.). — Alpen, Kt. Wallis, Simplongebiet, Gabi, Feerbergen, 10 6. 1953!

auf *Potentilla* sp. — Kt. Graubünden, Val Bever, hinter Station Spinas Rh.B. 16. 7. 1953!

Leptosphaerulina vitrea ist sicher nahe verwandt mit dem als *Pleospora potentilla* (Rostr.) E. Müller (vgl. Müller, 1951) beschriebenen Pilz.

4. Phacidium sieversiae.

Auf dürrem, fast vermorschtem Blattmaterial von *Sieversia montana* (L.) R. Br., welches ich schon vor einigen Jahren gesammelt, aber nie einer richtigen Untersuchung unterzogen hatte, fand ich kürzlich einen discomycetenartigen Ascomyceten aus der Familie der *Phacidiaceae*. Er stimmt morphologisch weitgehend mit *Phacidium lacerum* Fr., dem Typus von *Phacidium* Fr. überein, sodass man ihn auf den ersten Blick ohne Bedenken in diese Gattung stellen würde. Untersucht man aber die Sporen des Pilzes, so weichen diese von denen anderer *Phacidium*arten erheblich ab; sie sind spindelig und ihr Längen-Breiten-Verhältnis überschreitet das als maximal betrachtete 4:1 um ein Beträchtliches. Sie sind ausserdem mehrheitlich septiert, was allerdings auch bei andern Arten der Gattung, z. B. bei *Phacidium pini-cembrae* (Rehm) Terrier vorkommen kann. Der Pilz kann aber auf keinen Fall als *Hypodermataceae*, bei denen lange, dünne Sporen normalerweise vorkommen, eingereiht werden, da er im Stroma- und Fruchtkörperaufbau, in den Paraphysen und selbst auch in den Ascosporen keine näheren Beziehungen zu diesen erkennen lässt. Er darf deshalb auch nicht als Übergangsform zu diesen aufgefasst werden. Der Pilz ist eine *Phacidium*art mit extremer Ausbildung der Sporen.

In der Literatur habe ich keine entsprechende Beschreibung gefunden; ich betrachte ihn deshalb als neue Art:

Phacidium sieversiae E. Müller nov. spec.

Ascomata dispersa, primo substrato innata demum erumpentia, radiata, 300—400 μ latidudine, 120—180 μ altitidine, atrata, rimosodehiscentia. Excipulum base 30—35 μ crassum, subhyaline cellulis plus minusve rotundis, 3—6 μ diam. compositum, paries latere atratus, ca. 60 μ crassitudine cellulis dispositis ordinibus compositus. Paralleli asci fusoiformes, 50—55 ⇌ 6—7 μ, unitunicati, 8-spori, paraphysibus hyalinibus circumdati. Sporae fusoiformes, hyalines, 16—24 ⇌ 1.5—2 μ, non vel 1- — 3-septatae.

Hab. in foliis emortuis *Sieversiae montanae* (L.) R. Br. — Gallia, Alpes, Brigantia, Val Queyras, St. Véran, 26. 8. 1954.

Die auf dem Material weitläufig zerstreuten, im Umriss rundlichen, dem Substrat anfangs vollständig eingesenkten Apothecien brechen später an die Oberfläche durch und öffnen sich von der Mitte aus lappig. Sie sind im Durchmesser 300—400 μ gross, dabei 120—180 μ hoch, schwarz, durch Blatthaare aber zuweilen ziemlich versteckt. Die Fruchtkörperwand ist an der Basis 30—35 μ dick, im

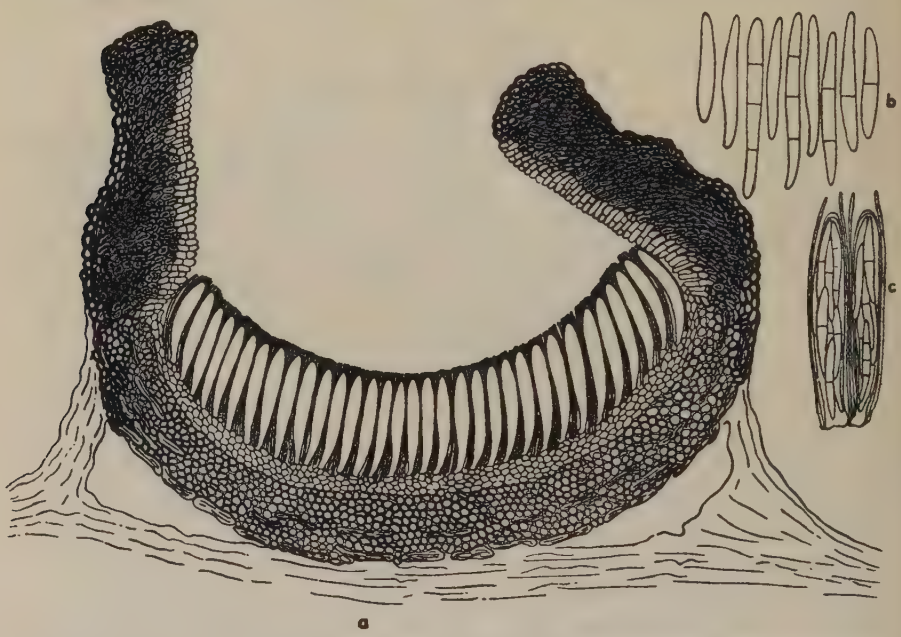

Abbildung 4. *Phacidium sieversiae*. a) Schnitt durch einen Fruchtkörper. Vergr. 250×. b) Ascosporen. Vergr. 1000×. c) Asci mit Paraphysen. Vergr. 500×.

wesentlichen aus derbwandigen, sehr hell gefärbten, zuweilen ganz hyalinen, isodiametrischen, 3—6 μ grossen Zellen aufgebaut, manchmal aber auch, besonders gegen den Rand zu, mit dunkel gefärbten Substratresten durchsetzt. Die lappig abstehende, bis 60 μ dicke Deckschicht ist im Gegensatz dazu sehr dunkel gefärbt. Aussen besteht sie aus einer mehr oder weniger stark mit Substratresten durchsetzten Kruste aus derbwandigen, isodiametrischen, 6—10 μ grossen, stark inkrustierten Zellen. Von hier aus verlaufen nach innen gekrümmte, zu innerst senkrecht zur Oberfläche gestellte Reihen von mehr oder weniger in der Reihenrichtung gestreckten, 5—7 μ grossen, aussen ebenfalls stark inkrustierten Zellen, welche nach innen heller werden und zuinnerst vollständig hyalin und zartwandig sind.

Die Asci stehen dicht parallel nebeneinander und bilden zusammen mit den sie nur schwach überragenden, zartfädigen, hyalinen Paraphysen ein nach unten gewölbtes Hymenium, an welches sich unten ein aus mehr oder weniger rundlichen, zartwandigen, hyalinen, nur seitlich auch schwach gestreckten, 3—5 μ grossen Zellen bestehendes ca. 8 μ tiefes Hypothecium anschliesst. Die Asci sind zylindrisch-spindelförmig, 50—55 ⇌ 6—7 μ gross, zartwandig und unten mit einem schmalen Fuss endend. Sie enthalten je acht schmal spindelige, gerade oder etwas gekrümmte, zuweilen stellenweise auch etwas verdickte, einzellige oder mit bis zu drei Quersepten unterteilte, hyaline, 16—24 ⇌ 1.5—2 μ grosse Ascosporen.

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Beiträge zur Flechtenflora Deutschlands.

Von E. Riehmer (Dresden).

Auf meinen Ferienreisen in den Jahren vor den beiden Weltkriegen, die mich meist in die bayrischen und tiroler Alpen führten, sowie bei zahlreichen Ausflügen in der engeren Heimat habe ich einige, für die Wissenschaft neue Flechten gefunden, die hier beschrieben werden sollen.

Lecidea (Biatora) elegantula E. Riehmer n. spec.

Thallus tenuis parviglaebulosus usque squamosus, planus, alliati-viridis; K — Gonidia cystococcoidea, viridia, rotundata, diam. 7 μ Apothecia pusilla, 0.15—0.27 mm, rotundata, adpressa sessilia, rufo-carnea, margine lucidiore, demum paulum convexa et superficie iniqua. Epithecium crassum, lutescens; hymenium dilutum, flavescens vel rubescens; jodo + luteum; paraphyses rubescentes, indistinctae, curvulae. Asci cylindrico-clavati, octospori. Sporae ellipsoideae, dilutae, continuae, oblique 1-seriatae, 7—11 μ longae, 4—5 μ latae. Prope vicum bavaricum Lenggries in valle Längental ad truncos abietum; altitudine 900—1000 m. 7. VII. 1937 leg. E. Riehmer. (Herb. Mus. Hist. Natur. Vindobon.)

Lager dünn, kleinschollig-schuppig, flach, lauchgrün. K — Gonidien grün oder gelbgrün, rundlich, 7 μ im Durchmesser. Apothecien sehr klein, 0.15—0.27 mm, regelmässig rundlich, angedrückt sitzend, lachsrot mit hellerem Rande; Scheibe flach, später leicht gewölbt und mit unebener Oberfläche. Epithecium dick, gelblich. Hymenium hell, gelblich bis rötlich. Paraphysen rötlich, undeutlich, zart, etwas geschängelt. Schläuche walzig-keulig, 8-sporig. Sporen elliptisch oder ellipsoidisch, hell, einzellig, einreihig schräg im Schlauche, 7—11 ⇌ 4—5 μ.

Oberbayern: Längental bei Lenggries, an mittelstarken Tannen. 7. 7. 1937.

Nach der Literatur am nächsten verwandt mit *Lecidea prasinella* Müll. Arg., die ich nicht gesehen habe. Namentlich stimmt das korallenartige, lauchgrüne Lager damit überein, ferner das helle Hymenium, die kleinen Apothecien und die kleinen Sporen. Die Apothecien sind aber in der Form und Farbe ganz verschieden, bei *elegantula* mit flacher oder höchstens leicht gewölbter Scheibe (im Alter) mit hellerem und bleibendem Rande, bei *prasinella* dagegen schon in der Jugend gewölbt und bald randlos, später hoch gewölbt

bis fast kugelig. Die Farbe der Apothecien bei *elegantula* zart lachsrot mit hellerem Rande, auch inwendig sehr hell und nur durch die Paraphysen leicht gelblich bis rötlich getönt; bei *prasinella* die Apothecien missfarben bis grünlichschwarz, ebenso die Hymenialschicht missfarben grünlich und durch Jod schmutzigblau, während Jod *elegantula* sattgelb färbt. Die Sporen werden bei ersterer 5—7 ⇌ 1.75—2 μ gross und keilförmig bis verkehrt-eiförmig beschrieben, während sie bei *elegantula* regelmässig ellipsoidisch sind und 7—11 ⇌ 4—5 μ messen.

Staurothele isarina E. Riehmer, n. spec.

Thallus tenuis, sordido-canus vel fuscescente-canus at semper ± clarus, plurimum variabilibus algis viridibus tectus, continuus. Perithecia in verrucis frugum nigris semiglobosis immersa, 0.4—0.5 mm lata. Involucrellum fuscum ad nigrum, in ostio cum excipulo coalescens et ad tertiam partem ab eo distans. Excipulum atrum, in ostio lanato-periphysatum. Gonidia hymenialia crebra, flavo-viridia, globosa, pauca ellipsoidea, diam. 3—4 μ. Asci cylindraceo-clavati, 135—205 ⇌ 32—48 μ, octospori. Sporae ellipsoideae, ovatae vel fere globosae, rubellae, longitudinaliter 3—4, transverse 9—15-septatae 19—42 ⇌ 12—25 μ. Balneum Tölz, Bavaria, Isarlust ad pedem montis Calvariae, ripa dextra fluminis Isar in lapidibus calcareis; 650 m. 1937, leg. E. Riehmer. (Herb. Mus. Hist. Natur. Vindobon.)

Lager dünn, schmutziggrau bis bräunlichgrau, aber immer ± hell, meist von grünen Algen bedeckt, die nicht zur Flechte gehören; weinsteinartig-mehlig, zusammenhängend. Früchte in schwarzen, halbkugeligen Fruchtwarzen, die sich über das Lager erheben, eingesenkt und im trockenen Zustande sich als heller Pfropfen in der Fruchtwarze zeigen, im feuchten Zustande aber eine schüsselartige Vertiefung der 0.4—0.5 mm breiten Fruchtwarze darstellen, in deren Mitte das Perithecium rot hervorleuchtet. Involucrellum schwarzbraun bis schwarz, an der Mündung mit dem Excipulum verwachsen und bis zu einem Drittel von ihm abstehend. Excipulum schwarz, an der Mündung ein dichter Filz von Mundfäden. Das Perithecium enthält eine grosse Menge von Hymenialgonidien, die hellgrün, kuglig, wenige auch ellipsoidisch sind und einen Durchmesser von 3—4 μ haben. Schläuche walzig-keulig, 135—205 ⇌ 32—48 μ, 8-sporig. Sporen ellipsoidisch, eiförmig bis fast kuglig, lachsrot und mauerförmig geteilt, mit 3—4 Längs- und 9—15 Querwänden, 19—42 ⇌ 12—25 μ.

St. isarina steht am nächsten der *St. immersa* Dalla Torre und Sarnth., von der sie sich hauptsächlich durch kürzere Sporen unterscheidet und durch die regelmässige Zahl von 8 Sporen im Schlauche, während bei *St. immersa* die Zahl zwischen 4 und 8 schwankt. Die Sporen von *isarina* sind lebhaft rot gefärbt, so dass in der Frucht-

warze im feuchten Zustande bei Betrachtung mit der Lupe das Perithecium als roter Punkt durchleuchtet.

Polyblastia foveolata E. Riehmer, n. spec.

Thallus expansus, continuus, tenuis, ca. 120—225 μ crassus, fusco-cinereus vel nigrescenti-cinereus, apotheciis excisis foveolatus. Perithecia immersa, nigra, 0.3—0.5 mm lata, hemisphaerica, latiora quam alta, superne applanata; vertex superficiei par, thallo non tectus. Involucrellum atrum, superne excipulum tegens, ab eo obstans aut ad dimidiam partem eo adjacens. Excipulum atrofuscum, hymenium jodo ± coerulescens, ostiolum periphysibus dense praeditum. Asci clavati, octospori. Sporae dilutae, ellipsoideae, primum tetrablasteae, demum singulae cellulae obliquis aut rectis septis denuo divisae, postremo castanenae, 23—32 μ longae et 11—15 μ latae. In valle Müglitztal prope villam Weesenstein in rupibus calcareo-schistosis anno 1943 leg. E. Riehmer. (Herb. Mus. Hist. Natur. Vindobon.)

Lager ausgedehnt, zusammenhängend, halbbinnen, weiss oder schmutzigweiss, dicklich, weinsteinartig-mehlig, 120—225 μ dick, unten in ein loses Hyphengeflecht übergehend. Gonidien hellgrün, in breitem Bande von der Mitte an das obere Drittel einnehmend, 5—8 ⇌ 4—7μ rundlich oder eiförmig-rundlich. Apothecien schwarz, zahlreich, eingesenkt, nur mit dem Scheitel vorragend, später zusammensinkend und mit dem Lager gleich hoch, nach dem Ausfallen Gruben hinterlassend, halbkugelig bis verkehrt herzförmig, etwas breiter als hoch, am Scheitel meist abgeflacht oder leicht eingesattelt, 0.3 mm im Durchmesser. Lagergehäuse schwarz, um die Mündung stark verdickt, bis zur Hälfte das Eigengehäuse umgebend und ihm eng anliegend, an einer Seite meist stärker entwickelt als an der andern, unter der Mündung wie die Fransen einer Decke mit zahlreichen Periphysen, 21—34 ⇌ 0.6—1.5 μ. Eigengehäuse schwarzbraun, oben mit dem Lagergehäuse verschmolzen. Kern weiss; J + dunkelblau › weinrot, Sporen aber gelb. Sporen hell oder zart rosa, später gelb und im Alter braun; ellipsoidisch, an beiden Enden gleichmässig abgerundet, andere mehr eiförmig, bis fast kuglig, mit 2—4 Quer- und 6—8 Längswänden, daher mauerförmig vielteilig, 20—40 ⇌ 17—24 μ also zu Zschacke's Sektion *Polyblastidea* gehörig.

Am Originalstandort bei Weesenstein ist diese Flechte weit verbreitet und in grosser Menge, aber nicht an den Felsen an den Seiten des Fussweges, sondern an den höheren Felsen, bez. in grösserer Höhe der unteren Felsen, wo sie sich schon durch die grossen weissen Flecke auf der grauen Unterlage verrät. Zwei dünne Wasserläufe kommen von oben die Felsen herab, doch befindet sich die *Polyblastia* ausserhalb derselben.

Am gleichen Standort kommen noch vor *Rhizocarpon calcareum* (Weis) var. *subconcentricum* (Fr.) Schade, *Gyalecta jenensis* (Batsch), *Caloplaca citrina* (Hffm.) Th. Fr., *Protoblastenia incrustans* (DC.) Stnr., *P. monnticola* (Ach.) Stnr., *Verrucaria fuscella* (Turn.) Kbr., *V. praetermissa* Anzi, *Thermutis velutina* (Ach.) Flot. c. fr. und eine unbekannte sterile *Pertusaria*. Alle diese kalkholden Flechten beweisen den hohen Kalkgehalt der Schieferfelsen; das bezeugen andererseits auch die Moose, die sich hier angesiedelt haben, von denen nur *Mnium serratum, Plagiopus Oederi* (jetzt verschwunden) *Webera cruda* (L.) Bruch, *Gymnostomum rupestre* Schleich, *Eucladium verticillatum* (L.) Br. eur., *Encalypta contorta* (Wulf) Lindb., *Ctenidium molluscum* (Hedw.), *Hygrohypnum palustre* (Huds.) Loeske und *Campylium protensum* (Brid.) Broth. genannt seien, alles Moose, die Kalk als Unterlage bevorzugen.

Thelidium amethystinum E. Riehmer, n. spec.

Thallus cinereo-viridis, albescenti-viridis et persicino-coloratus, obscurus, granulosus, continuus aut maculosus, extra lapidem, cum gonidiis rubris et viridibus et hyphis claris. Algae globosae aut fere globosae, 5,6, 3,2—4,8 et 5,5) μ. KOH ope colore amethystino reagens. Perithecia parvula, 0,2—0,25 mm, splendide atra, immersa, madide prodientia, ab thallo usque ad porum obteca. Involucrellum ab excipulo separatum, operculum curtum aut scutulum majusculum ad instar, excipulum obtegens et margine ab eo distans vel ut galericulum perithecium ad quartam aut tertiam partem obtegens et a latere ab eo distans; atro-fuscum et satis crassum. Excipulum pullum, plerumque fuscum, deorsum nonnihil clarius, supra obscurius et cum involucrello connatum, tenue. Asci saccato-clavati, octospori. Sporae lucidae atque fuscescentes, primum bipartitae, postea quadripartitae, ellipsoideae aut oblongo-cuneatae, utrinque rotundatae. Septa non semper recta, sed saepe oblique et abnormalia, 25—33—44 (48) ⇌ 9,5—16 μ, plerumque 30 ⇌ 14 μ.

In pago Borna (apud Berggiesshübel, Saxonia) in fastigio calcario anno 1935, leg. E. Riehmer, (Herb. Mus. Hist. Natur. Vindobon. Herbar d. Botan. Instituts d. Techn. Hochschule, Dresden.)

Lager graugrün, weisslichgrün und pfirsichblütenrot, dunkel, körnig-schorfig, zusammenhängend oder fleckweise, sich den Unebenheiten der Unterlage anschmiegend, oberflächlich, mit roten und grünen Gonidien und hellen Hyphen. Algen kuglig oder fast kuglig, 5,6, 3,2—4,8 und 5,5 μ. Auf KOH reagiert das Lager schön amethystfarben, daher der Name. Perithecien klein, 0,2—0,25 mm, glänzend schwarz, eingesenkt, nur feucht vortretend und gut sichtbar, vom Lager bis an den Porus bedeckt. Aussengehäuse vom Eigengehäuse gesondert, als kurzer Deckel oder grösserer Schild das Eigengehäuse

bedeckend und am Rande von ihm abstehend oder wie eine Kappe die Frucht zu einem Viertel oder Drittel bedeckend, an den Seiten von ihm abstehend, schwarzbraun und ziemlich dick.

Eigengehäuse braun, meist dunkelbraun, nach unten etwas heller, oben dunkler und mit dem Aussengehäuse verwachsen, dünn. Schläuche sackig-keulig, 8-sporig. Paraphysen früh verschleimend. Sporen hell bis bräunlich, erst 2-, später 4-teilig, ellipsoidisch oder länglich-keilförmig, an beiden Enden abgerundet. Die Querwände nicht immer gerade, sondern oft schräg und unregelmässig, 25—33 —44(48) ⇌ 9,5—16 μ, meist 30 ⇌ 14 μ.

Th. amethystinum gehört nach der Einteilung von Zschacke in die *Incavatum*-Gruppe, ist aber von *Th. incavatum* und den mit diesem verwandten Arten durch den Besitz eines Aussengehäuses (Involucrellum), das jenen fehlt, und ausserdem durch die auffällige KOH-Reaktion das Lagers verschieden, die etwas an *Verrucaria praetermissa* erinnert, weil Querschnitt von rötlich gefärbten Teilen des Lagers auf KOH schön veilchenblau reagieren. Das geschieht aber bei *Thel. ameth.* nicht nur an den aussen rot gefärbten Partien, sondern überall, auch bei der Varietät, wenn auch hier in schwächerem Masse.

Thelidium amethystinum E. Riehmer **bornaense** E. Riehmer n. var.

Thallus tenuis, farinaceus, continuus, nonnunquam rimuloso-areolatus, nigrescenti-canus aut fuscescente-atro-canus, interdum rubescenti-canus. Prothallus ambiguus. K — aut +. Perithecium primum immersum, deinde ± prodiens et elato-sedens, 0,2—0,3 mm latum. Involucrellum peltatum, excipulum obtegens, tantum in vertice cum eo connatum, crassum. Excipulum phaeum, tenuius, globosum. Asci et sporae ut in typo, bipartitae 25 ⇌ 14 μ, quadripartitae 30—38 ⇌ 12—15 μ.

Cum forma typica in pago Borna apud Berggiesshübel ad lapides calcarios, 1935, leg. Riehmer. (Herb. Mus. Hist. Natur. Vindobon. und Herb. Botan. Institut d. Techn. Hochschule, Dresden.)

Das Lager der Varietät ist dünn, zusammenhängend, manchmal rissig gefeldert, schwärzlichgrau oder bräunlich schwarzgrau, zuweilen auch etwas rötlichgrau. Vorlager undeutlich, K + oder —. Auf Querschnitten in KOH sich langsam blasslila färbend, nach längerem Liegen (1 Tag) in KOH intensiv lila und zwar jedes Lager, nicht nur das rötlichgraue. Perithecien eingesenkt, später ± hervortretend, erhaben sitzend, 0,2—0,3 mm breit. Involucrellum schildförmig, das Eigengehäuse bedeckend, nur am Scheitel mit diesem verwachsen. Excipulum schwarzbraun, dünner, kugelig. Schläuche und Sporen wie bei der Hauptform.

Die Varietät unterscheidet sich von der Hauptform durch das dünne und schwarzgraue Lager und die weit schwächere, langsamere Reaktion des Lagers auf KOH, während das Lager der Hauptform viele Stellen mit pfirsichblütenroter Färbung aufweist. Das Substrat ist bei der Varietät ein anderes, nämlich Steine im Kalkgeröll. Die Flechte kann nicht tief eindringen, und die Perithecien heben sich deutlicher hervor.

Pertusaria Freyii Erichs. = *Lecanora verrucosa* (Ach) Th. Fr. 1943 erhielt ich von dem Münchner Oberlehrer J. Schwind unter Flechten, die ich ihm bestimmen sollte, auch eine Flechte die ihm der bekannte Pertusarienkenner Erichsen (Hamburg) als *Pertusaria Freyii* Erichs., also als etwas Neues bestimmt hatte. Mir war aber diese Flechte schon längst bekannt; ich selbst hatte sie in den Alpen schon mehrfach gefunden und als *Lecanora verrucosa* bestimmt. Erichsen, dem ich Präparate von dieser Kollektion und von zwei anderen, in den Alpen bzw. in Böhmen gesammelten Exemplaren gesendet habe, bestätigte mir die Identität mit *Lecanora verrucosa,* wies aber ausdrücklich darauf hin, dass man diese Flechte als *Pertusaria* einreihen müsse. Schon der äussere Eindruck, den sie mit ihren in Fruchtwarzen eingeschlossenen Apothecien macht und die für eine *Lecanora* ungewöhnlich grossen und dicken Sporen, wie sie bei keiner *Lecanora* anzutreffen sind, sprechen für die Zugehörigkeit zu *Pertusaria.* Erichsen hätte sin nun *Pertusaria verrucosa* nennen können, wenn er die Identität mit *Lecan. verr.* erkannt hätte. Da das aber nicht der Fall war, gab er ihr einen neuen Namen und taufte sie nach dem bekannten Schweizer Flechtenforscher *P. Freyii.* Weil es aber bereits eine *Pertusaria verrucosa* Mont. gibt, muss diese Flechte als *Pertusaria Freyii* Erichs. eingereiht werden.

Erichsen ist wohl nicht mehr dazu gekommen, den Irrtum zu berichtigen und den neuen Namen zu veröffentlichen; dies soll hier nachgeholt werden:

Pertusaria Freyii Erichs. — Thallus fere cartilagineus, verrucosus, levis, albus vel cano-albidus, prothallio albo; KOH —. Apotheciis in verrucis immersa, disco depresso, demum fere applanato, nigro, nudo vel tenuiter pruinoso, margine albo, integro, ad 1.5 mm latis. Epithecium viridescens; hymenium dilutum, J + coeruleum; hypothecium viridescens. Paraphyses gelatinoso-conglutinatae, viridescentes. Asci ventricoso-clavati, 8-spori. Sporae unicellulares, dilutae, ellipsoideae, limbatae, 30—48 ⇌ 19—33 μ.

Lager fast knorpelig, glatt, warzig, uneben, weiss bis grauweiss, auf weissem Vorlager, KOH. — Apothezien in Fruchtwarzen eingesenkt, mit vertiefter, später fast flacher, schwarzer, nackter oder schwach bereifter Scheibe, weissem, ungeteiltem Lagerrande, bis 1.5 μ breit. Epithecium grünlich; Hymenium hell, Jod + blau. Hypo-

thecium grünlich. Paraphysen gallertig verklebt, grünlich. Schläuche dick keulig oder bauchig-keulig, 8-sporig. Sporen einzellig, hell, ellipsoidisch, gesäumt, 30—48 ⇌ 19—33 µ.

Ich fand diese eigenartige Flechte in den Alpen der Berchtesgadener Umgebung auf dem Untersberg in 1900 m Höhe, am Schneibstein bei 2200 m auf Pflanzen, Stengeln und auf Ästchen der Alpenrosen, ebenso Schwind im Allgäu am Fiderepass und im Soierngebiet. Auf abgestorbenen Pflanzen habe ich sie in Tirol bei Ober-Gurgl an der Geisbergbrücke gefunden. Von Servit wurde sie in Böhmen und in den Kleinen Karpathen gesammelt. Sie zeigt stets die gleiche Ausbildung und die gleiche Struktur.

Im Anschluss an diese Neuheiten sollen noch einige Seltenheiten der sächsischen Flechtenflora mit ihren Standorten folgen.

Acarospora pelioscypha (Wahlb.) Arn. Erzgebirge: Lauenstein-Löwenhain.

A. rhagadiza (Nyl.) Hue Goppeln b. Dresden, Lehmgrube.

Arthropyrenia conoidea (Fr.) Zahlbr. Weesenstein.

Buellia canescens (Dicks.) De Not. Seidewitztal u. Müglitztal, am Rabenhorst.

Calicium arenarium Hpe. Gneisfelsen im Rabenauer Gründe.

Endocarpon pusillum Hedw. Am Kalkberg b. Biensdorf.

Gyalecta gloeocapsa (Nitzschke) Zahlbr. Bergfuss am Auersberg u. Heidrichsweg b. Sosa (cf. A. Schade, Zur sächsischen Flechtenflora in Nova acta leopoldina, 17. Bd., 1955.) Ausserdem Wildental, Rehhübel; Altenberg, am Kahleberg; Dresdner Heide: vom Priessnitztal nach der Hofewiese; überall auf sterbenden oder zum Absterben gebrachten Moosen, vor allem *Alicularia* (*Nardius* Gray).

Gyalecta truncigena (Ach) Hepp Steinbach, c. fr.

Jonaspis epulotica (Ach) Th. Fr. Müglitztal zwischen Schlottwitz u. Glashütte; Rabenauer Grund, an Felsen u. an Blöcken in der Weisseritz. An der Felswand auch die var. *patellula* Arn.

Lecidea assimilis Hpe. am Geising an Basalt, auf den Bergwerkshalden b. Johanngeorgenstadt auf Granit.

L. athroocarpa Ach. Am Geising u. Schönwalder Spitzberg.

L. pycnocarpa Kbr. Erzgeb.: Lauenstein-Löwenhain. Schönwalder Spitzberg.

Microglaena corrosa Arn. Am Geiseng an Basalt, bei Wildental, am Auersberge an Granit.

Microphiale modesta Lett. An Basalt u. Klingstein am Geising. (Beleg in Herb. Mus. Hist. Natur. Vindobon.).

Placynthium nigrum (Huds) Gray Pirna: Grossedlitz und Krebs. Dresden: Dohna, am Raupschen.

Porina lectissima (Fr.) Zahlbr. Rabenauer Grund, an Gneisfelsen; Müglitztal: b. Schlottwitz, an der grossen Eibe.

Polyblastia singularis Arn. Weesenstein.

Rhizocarpon Massalongi (Kbr) Malme var. colludens (Nyl.) Vain. An Gneisfelsen im Rabenauer Grunde, h.

Thelidium Rehmii Zsch. Dohna, Spargrund.

Th. Zwackhii Mass. Wilischbachtal, an Basaltsteinen.

Thelocarpon epilithellum Nyl. Dohna, Spargrund.

Staurothele fissa (Tayl.) Vain. mit

Allarthonia lapidicola (Tayl.) Zahlbr. im Rabenauer Grund auf grossen Gneisblöcken in der Roten Weisseritz.

Staurothele viridis Zsch. Rabenauer Grund an Blöcken und Steinen der Roten Weisseritz mit Wasser-Verrucarien.

Verrucaria aquatilis Mudd. Dohna: Spargrund, Rabenauer Grund. Johanngeorgenstadt, Karsbader Strasse.

V. acrotella Ach. Omsewitz bei Dresden, Steinbruch; Maxe an kleinen Schiefer- und Kalksteinchen; im Seidewitztal, Steinbrüche und im Kirnitzschtal bei Schandau.

V. elaeomelaena Arn. Kreischa-Reinhardsgrimma: Wilischbachtal, Müglitztal: bei Weesenstein; Erlabrunn im Erzgebirge: Schwarzwassertal, mit *Lecanora lacustris.*

V. fuscella (Turn.) Kbr Weesenstein, an den Kalkschieferfelsen mit anderen Kalkflechten.

V. griseorubens Mig. Pirna: Grossedlitz und Krebs, an Plänerstücken in Menge; ebenso bei Neundorf; an Kalkschiefer bei Weesenstein.

V. praetermissa Anzi. Weesenstein: auf feuchten Stellen der Kalkschieferfelsen zerstreut, häufiger im Rabenauer Grunde an Gneisblöcken in der Roten Weisseritz.

Häufig die Wasserverrucarien *denudata* Zsch. und *levata* Ach., ebenso die Landflechten *V. muralis* und *nigrescens.*

V. rheithrophila Zsch. Rabenauer Grund; Edle Krone: Wilde Weisseritz; Johanngeorgenstadt: Karlsbader Strasse, an triefenden Felsen.

Thermutis velutina (Ach) Flot. Weesenstein: in ziemlicher Ausdehnung auf einer bankähnlichen Kalkschieferfelsgruppe mit vielen Früchten. Es ist schwer, selbst für ein gutes, mit einer Lupe bewaffnetes Auge die dunklen Apothecien auf dem schwarzen Untergrund zu entdecken, was im feuchten Zustande etwas besser gelingt. Das ist wohl auch der Grund, weshalb an den Fundorten Mitteleuropas diese Flechte immer als steril angegeben wird. Nach den in der Literatur vorhandenen Angaben soll sie nur im hohen Norden fruchten. Hier in Weesenstein sind die Früchte gut ausgebildet.

Material von allen angeführten Flechten befindet sich in meinem Herbar, jetzt Herb. d. Bot. Instituts d. Technischen Hochschule. Dresden.

Über eine neue Venturiaceae.

Von Emil Müller.

(Aus dem Institut für spezielle Botanik der Eidgenössischen Technischen Hochschule, Zürich.)

Mit 1 Textabbildung.

Während einer gemeinsamen Exkursion nach Südfrankreich fand Herr Dr. H. Kern auf *Juniperus phoenicea* L. einen Ascomyceten, der eindeutig zu den Venturiaceen gehört. Ich möchte ihm auch an dieser Stelle herzlich für die Überlassung des Materials danken. Der Pilz sei nachstehend beschrieben:

Die kleinen, nur 200—300 μ grossen Stromata sind polsterförmig und wachsen parasitisch auf den Blattschuppen des Wirtes. Sie sind mit knollenförmigen Hypostromata dem Substrat eingewachsen. Im Mesophyll bestehen diese aus 6—10 μ grossen, hellbraunen, ziemlich zartwandigen, zum grossen Teil nur wenig zusammengepressten, eng ineinander verschlungenen Zellen, welche im Bereich der Epidermis derbwandiger, dunkler und mehr zusammengepresst werden und in mehr oder weniger senkrechten Reihen angeordnet sind. Das Hypostroma bricht mit dieser Partie durch die aufgewölbte Epidermis und erweitert sich darüber in eine glockenförmige, auf wenige Lagen von regelmässig vieleckigen, 5—8 μ grossen, derbwandigen, dunkelbraunen Zellen beschränkte Platte. Auf dieser sitzen die kugeligen, 80—100 μ grossen Fruchtkörper und bilden ein halbkugeliges, oft auch unregelmässig knolliges oder in einer Richtung ziemlich deutlich gestrecktes Polster. Die Gehäuse sind oft durch stromatische Komplexe miteinander verbunden, kahl oder aussen — wie auch das Basalpolster — sich in wenige braune, zellige, stumpf endende Hyphen auflösend, und sie öffnen sich mit einer heller gefärbten, papillenförmigen, von einem ca. 10 μ weiten Porus durchbohrten Mündung. Die Gehäusewand besteht aus 6—10 μ grossen, polyedrischen, dunkelbraunen, sehr derbwandigen Zellen.

Die sackförmigen, derb- und doppelwandigen, 35—45 ⇌ 15—7 μ grossen Asci sitzen nur zu wenigen in den Fruchtkörpern. Sie sind von spärlichen, fädigen, hyalinen Paraphysoiden umgeben und enthalten je acht Ascosporen. Diese sind anfänglich schmutziggelb, später tief olivenbraun gefärbt, schwach keulig, ungefähr in der Mitte septiert und etwas eingeschnürt, 13—16 ⇌ 4,5—5 μ gross.

Dieser Pilz lässt sich zwar leicht als Venturiacee erkennen, die Gattungszuteilung bietet aber einige Schwierigkeiten; vor allem die

Fruchtkörper erschweren die Interpretation des Pilzes. Zum Teil scheinen sie als Loculi dem oberflächlichen Stroma eingesenkt. Zusammen mit den dunklen Randborsten könnte der Pilz deshalb durchaus mit der Gattung *Trichodothis* Theiss. et Syd. verglichen werden (vgl. Petrak, 1947 a). Es fehlt ihm aber die sterile Mittelsäule in den oberflächlichen Stromata; diese sind in ihrem innern Aufbau auch viel inhomogener als bei *Trichodothis*. Ausserdem sind auch die Fruchtkörper doch häufig als selbständige Konzeptakel

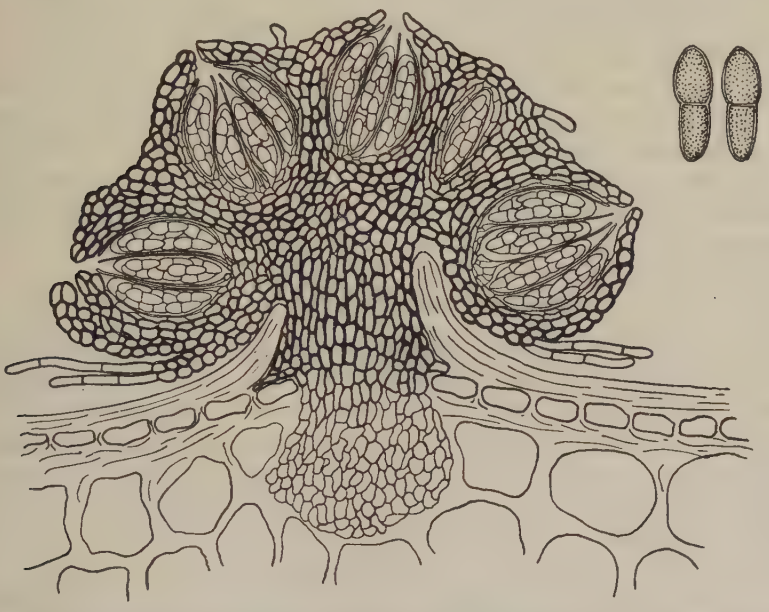

Abbildung 1. Schnitt durch ein Stroma von *Xenomeris hemisphaerica*. Vergr. 250 × und Ascosporen 1000 ×.

ausgebildet und man erkennt auch deutlich das plattenförmig erweiterte Stroma. Solche Pilze sind bis jetzt als *Xenomeris* Syd. emend Petrak (1947 b; 1954) eingereiht worden.

Um sicher zu sein, habe ich alle vier bis heute zu *Xenomeris* Sydow gestellten Arten [*Xenomeris Nicholsoni* (Cooke) Petr., *X. alpina* Petr., *X. eucalypti* Syd., *X. raetica* (E. Müller) Petr.] untersucht. Die von Petrak (1954) erwähnte grosse Variabilität in der Ausbildung der Stromaformen lässt sich darnach bestätigen und unser Pilz passt demnach ohne weiteres in die von Petrak (1954) gegebene Umschreibung der Gattung.

Die von mir früher (Müller, 1954) vertretene Ansicht, wonach *Xenomeris* Syd. mit *Gibbera* Fr. zu vereinigen sei, stützte sich auf eine weite Umgrenzung von *Gibbera* Fr. Nach der Untersuchung einer grösseren Zahl von Venturiaceen scheint es nun besser zu sein,

Gibbera Fr. enger zu fassen und *Xenomeris* — neben einer Anzahl weiterer Gattungen — aufrecht zu erhalten. Aber es unterliegt keinem Zweifel, dass *Gibbera* und *Xenomeris* derselben Entwicklungsreihe angehören.

Unser Pilz wurde auch mit weiteren auf Coniferen wachsenden *Venturiaceae* verglichen, nämlich mit *Phaeocryptopus* Naumouv. und *Seynesiella* Arnaud. Von beiden Gattungen weicht er erheblich ab. *Phaeocryptopus* besitzt wohl Hypostromata, diese sind aber reduziert und meist den Stromata des Wirtes eingesenkt. Bei *Seynisiella* Arn. fehlen sie vollständig. Die Typusart von *Seynisiella S. juniperi* (Fr.) Arn. kann zwar gelegentlich ebenfalls auf *Juniperus phoenicea* L. parasitieren, besitzt aber vollständig oberflächliche, dem Substrat mit flacher Basis aufgewachsene, meist freie, nur zuweilen zu wenigen miteinander verwachsene Fruchtkörper. Da ich in der mir zugänglichen Literatur keine andern Pilze fand, auf die die obige Beschreibung passen würde, soll der Pilz als neu beschrieben werden:

Xenomeris hemisphaerica nov. spec.

Hypostromata minuta, tuberosa, substrato innata, erumpentia, prosenchymatica, supra substrato in partem qualis campana transientia, marginaliter hyphis brunneis ornata. Perithecia globosa, aggregata, in stromatis superficie insidentia, 80—100 μ diam, partibus stromaticis connecta, glabra vel hyphis paucis imposita. Asci pauci saccati, bitunicati, 35—45 ⇌ 15—17 μ, 8-spori, paraphysoidibus raris circumdati. Sporae 13—16 ⇌ 4,5—5 μ, plus minusve clavatae, circa media septatae et leniter constrictae, olivaceo-fuscae.

In foliis vivis *Juniperi* phoenicei L. parasiticis — Gallia, in montibus Alpes maritimes, Tende, Monumento, 22. 6. 1955, leg. H. Kern.

Literatur.

Müller, E. 1954 — Sydowia 8, 60—73.
Petrak, F. 1947 a — Sydowia 1, 28—31.
— 1947 b — l. c. 101—103.
— 1954 — l. c. 8, 287—303.

Fungi Mexicani, Series secunda — Agaricales[1])

By Rolf Singer (Tucumán, Argentina).

Several of my own collections and some collections made by G. Guzmán Huerta, Mexico D. F. provide the occasion for a second series of contributions to the mycological flora of Mexico.

Hygrophoraceae.

Hygrotrama gen. nov.

Pilei epicute hymeniformi ex elementis vesiculosis efformata *aut* hyphis defibulatis (aut epicute hymeniformi et simul hyphis fibulis destitutis), raro epicute ex hyphis repentibus fibuligeris consistente, sed semper in tramate hymenophorali hyphae latiores (usque ad 35 μ attingentibus), praesertim in mediostrato adsunt. Sporis inamyloideis, ceterum Neohygrophoro comparabile genus; Camarophyllis simile sed notis hic expositis distinguendum genus. Species typica: *H. dennisianum* Sing.

Hygrotrama dennisianum Sing. spec. nov.

Peilo epicute hymeniformi vel subhymeniformi manifesta obecto; sporis 5—7 × 3.5—5.2 μ, levibus, inamyloideis, hyalinis; basidiis tetrasporis; cystidiis nullis; tramate hymenophorali subregulari vel subirregulari, ex elementis angustis latisque composito; hyphis omnibus fibulatis. In apricis vel in plantationibus haud umbrosis. Ceterum „Hygrophoro" .hymenocephalo (cf. inferius!) persimilis species. Typus in herbario LIL conservatus est.

Hygrotrama dennisianum Sing. gen. nov., spec. nov.

Pileus pearl gray to drab, sometimes the center and one side of the pileus fuscous, glabrous to minutely pruinate, often rivulose-cracking, not viscid, not hygrophanous, convex, then with convex to merely declivous marginal portion and flattened to depressed disc, 40—44 mm. broad. — Lamellae light gray, more or less reticulate-intervenose in interspaces, horizontal or descendant, broad, subdistant to distant. — Stipe concolorous with either lamellae or stipe, dry, slightly innately longitudinally fibrillose-striped, smooth, glabrous and either in the beginning or in age slightly superficially fibrillose, glabrescent or not, solid, tapering downwards, 31—49 × 9—10 (at

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[1]) The first series was published in Sydowia (Ann. Mycol. ser. II) **11**: 254—274. 1957. A third series is in preparation.

apex), 3—4 (at base) mm. — Context almost concolorous wiht the surfaces, fleshy; odor none; taste agreeably farinaceous. — Spores 5—7 × 3.5—5.2 μ, short cylindric or short ellipsoid, sometimes subglobosa or ellipsoid, smooth, thin-walled, hyaline, inamyloid. — Hymenium: Basidia 23—33 × 5.5—7 μ, 4-spored; cystidia and cheilocystidia none. — Hyphae: Subhymenium of small elements, subcellular, hyaline. Hymenophoral trama subregular-subirregular, irregular near the junction with the trama of the pileus, consisting of hyaline-smoky-stramineous hyphae which are interwoven but mostly axially arranged, almost subparallel in some portions near the subhymenium and in the very central strand (mediostratum) in the half near the edge, very variable in size, all elongated, but in mediostratum some reaching 35 μ diameter (while others remain narrowly filamentous. All hyphae inamyloid, with clamp conncetions.

Covering layer of pileus: Epicutis a hymeniform or subhymeniform layer of medium to large hyaline to pale fuscous balloon shaped elements whose lower portions or at least pedicels show o brown colored wall just as most elements of the cutis underneath (the hypodermium). In the flesh underneath the hypodermium, the broad elements become gradually more numerous as the lamellae are approached.

In open places, pastures, meadows, sometimes under bamboo, or near plantations solitary or in groups fruiting in the rainy season.

Material studied: Mexico: Oaxaca, Huautla de Jiménez, 13-VII-1957. R. Singer no. M 1553 (LIL). — Trinidad: St. Joseph, 20-X-1949. R. W. G. Dennis (K).

This species shows that the clamp-less hyphae of what is known as *Hygrophorus hymenocephalus* are not a generic character. This has already been concluded from the reexamination of *„Hygrophorus* sp. near *hymenocephalus* Smith & Hesler" Dennis, Kew Bulletin for 1953, p. 255, see Singer, Type Studies on Basidiomycetes, Sydowia 9: 369—370, 1955. It shows likewise that neither the clamp-bearing nor the clamp-less species of the group here combined have what may be considered and has been described as typical hymenophoral trama structure in *Camarophyllus*. These are indeed species which are in a way intermediate between the typical Camarophylli and the typical Hygrocybes as far as the external and hymenophoral characters are concerned. Yet, they are separable from both genera by the characters of the epicutis and/or the hyphal septation.

This group of species includes the folowing „Hygrophori":
Hygrotrama dennisianum Sing.

Hygrotrama hymenocephalum (Smith & Hesler) Sing. comb. nov. (*Hygrophorus hymenocephalus*) Smith & Hesler, Journ. El. Mitch. Sc. Soc. **56**: 311. 1940.

Hygrotrama microsporum (Smith & Hesler) Sing. comb. nov. (*Hygrophorus microsporus* A. H. Smith & Hesler, Lloydia **5**: 11. 1942).

Apparently, a detailed restudy of the Hygrophori transferred by me (Lilloa **22**: 216—218. 1951) will show that they all belong in *Hygrotrama* as outlined above, i. e. *H. paupertinus, H. deceptivus,* and perhaps also *Omphalia atropuncta* (Pers ex Fr.) Sacc. will have to be transferred to the new genus. At present, we propose the formal transfers only in those cases that were restudied by the author in recent times.

On the other hand, Smith & Hesler, in a recent paper (Sydowia **8**: 319. 1954) give a key to the clamp-less Hygrophori which combines, in fact, all the species with thick lamellae (and mostly relatively long basidia) and without clamp connections. While this author has already admitted that it is preferable, on the basis of the new evidence provided by the case of *Hygrotrama dennisianum,* to separate the hygrophoroid clampless species from *Armillariella* and include them in the family Hygrophoraceae, it does not follow that they are congeneric with *Camarophyllus* as Smith & Hesler feel so strongly. These authors have become rather polemical on this question, and have forgotten that — even though their generic concept in *Hygrophoraceae* may be somewhat different from that of Fayod, Maire, Lange, Singer, Moser, and many other authors — a problem is not solved by synomymizing two or more genera: The same questions will haunt the specialist on the level of infrageneric taxonomy. It cannot be said that *Hygrophorus* sensu Smith & Hesler is as homogenous a genus as *Russula* or even *Cortinarius,* and we have to look for the point where the hiatus between the possible subdivisions are hidden (or apparent), whether we later decide that these hiatuses separate what we prefer to call subgenera, or genera. Leaving the genus *Hygrotrama* within *Hygrophorus* sensu lato without delimiting it even on the subgeneric level, one must come to the conclusion that *Hygrocybe* and *Camarophyllus* cannot be separated. But working out its limits, one will arrive at a much more homogeneous residual group in *Hygrocybe* as well as in *Camarophyllus.* If further taxonomic studies should show that this conclusion is wrong, we shall have to admit our error and attempt to reorganice the taxonomy of the genus on the basis of new evidence. But the present published evidence and the data in my notes forcefully suggest the solution provided by the distinction of the new genus *Hygrotrama.* As for *„Hygrophorus" marginatus* which I have (1943) transferred to *Tricholoma,* subgenus *Humidicutis* (Sing. 1948), and which may likewise better be recombined with the *Hygrophoraceae,* once clampless species are admitted in that family, it does not

automatically become a *Hygrocybe* (or *Hygrophorus* subgenus *Hygrocybe*) again, as Smith and Hesler seem to believe. These authors go so far as to doubt my statement that I have observed chemical differences between *Humidicutis* and *Hygrocybe,* differences which I have demonstrated to the mycologists present in the 1953 season at Cheboygan Mich. and which consisted in the following:

KOH (10%) dissolves the pigment of *„Hygrophorus" marginatus* and destroys it, bleaching it, to practically colorless. In the same solution, *Hygrocybe flavescens* and other true Hygrocybes available at that time did not show any such action of KOH and the pieces of carpophores left in KOH remained colored. Anilin stains the lamellae of *„Hygrophorus" marginatus* sordid olive brown while on the lamellae of *Hygrocybe flavescens* a characteristic orange-salmon discoloration was observed. The conclusion that the corresponding pigment in *Hygrocybe* is not identical with that of *„Hygrophorus" marginatus* does not appear to be far-fetched or unreasonable. This observation, on the contrary gives more weight to the direct observation in the field suggesting that the Ridgway and Maerz & Paul values of the colors involved are different from those obtained from the Hygrocybes studied by me in this regard. Already in 1942 and 1943 I noted „between flame scarlet and grenadine-red" (Ridgway) for the pileus and „flame scarlet" to „a tone deeper and brighter than anything in Ridgway" for the lamellae, with some further variations in both cases. Furthermore, „water extracting the pigment becominig colored by it, KOH and NH_4OH strongly bleaching causing the pigmented surfaces first to become yellow, then pallid". This material (N 312, F 471 A, F 471 B, F 2738, F 2875) is deposited at FH and F respectively.

It is true that I have not published my respective notes beyond the short characterization I have provided fo the taxa above the species level, adopted in my „*Agaricales* in modern taxonomy". It seemed to me then — and I cannot help thinking so now — that certain suggestions that come to the specialist of a given group should and could be taken into consideration without causing a reaffirmation of past views in tones which — had they not come from excellent mycologists whose intention was certainly not one of personal attack — might have had an effect quite different from the one this whole taxonomic controversy has actually had: a constructive re-evaluation of the material at hand.

As a consequence of the considerations about *„Hygrophorus" marginatus,* I am convinced that this species, together with its relatives, as for example,*„Hygrocybe" czuica* Sing. (*Tricholoma czuicum* (Sing.) Sing.), should be separated from both *Hygrocybe* and *Tricho-*

loma, but also from both *Camarophyllus* and *Hygrotrama* as a new genus of the *Hygrophoraceae* [2]).

Hygrocybe erinacea (Pat.) Sing. comb. nov.

Hygrophorus erinaceus Pat., Bull. Soc. Mycol. F. **25**: 10. 1909. Oaxaca: Huautla de Jiménez, 11-VII-1957, R. Singer, M. 1517 (LIL.)

This species is new for Mexico. It was discovered in the Eastern tropics, and was first reported as far as the Western Hemisphere is concerned by Dennis who describes a somewhat doubtful collection from Trinidad which does not fully agree with the original description but much more with a species or variety (of *H. conica*) which is known as *H. conicus* var. *peradenycus* Sacc. Our specimens do not show any trace (except innate black fibrils) of the originally very striking hirsute character of the surfaces which is due to numerous erect fibrils on the surface of pileus and stipe. This same species is rather frequent in the tropical parts of Bolivia. *H. erinacea* belongs in section and subsection *Conicae*.

Hygrocybe mexicana Sing. spec. nov.

Pileo laetissime coccineo, glabro, sulcato striatoque, haud viscido, 10 mm. lato, convexo, umbilicato. Lamellis flavis roseorubrisque, latissime adnatis, subdecurrentibus, distantibus. Stipite pileo concolori, sicco, 21 × 1.5 mm. Odore nullo. Sporis 7—9.5 × 4—7 μ, levibus, haud manifeste dimorphis, basidiis 2—4-sporis, haud manifeste dimorphis, epicute pilei haud gelatinosa, nec stipitis superficie strato mucilaginoso praedita. Ad marginem plantationis. Specimen in LIL conservatum est. *H. firmae, sipariae, coccineae* affinis.

Pileus brightest scarlet red, glabrous, with sulcate and at the same time transparently striate margin over one half of the radius, not viscid, convex, umbilicate, about 10 mm. broad. — Lamellae yellowish mixed with pinkish red, very broadly adnate and either with a slight not very striking decurrent tooth, or subdecurrent, distant, very broad. — Stipe brightest scarlet red, not striate, not viscid, slightly tapering upwards, 21 mm. long, 1.5 mm. broad at apex, reaching 2.5 mm. in diameter at base. — Context almost concolorous with the surfaces, without noticeable odor. — Spores 7—9.5 × 4—7 μ, ellipsoid, rather variable but not falling into definite categories of size or shape, smooth, hyaline. — Hymenium: basidia 25—35 × 7.2—9.2 μ, 2—4-spored, clavate, not dimorphic but remark-

[2]) **Humidicutis** (Sing.) Sing. stat. nov. (genus) (*Tricholoma*, subgenus *Humidicutis* Sing., Sydowia **2**: 28. 1948). Species typica generis: **H. marginata** (Peck) Sing. comb. nov. (*Hygrophorus marginatus* Peck, Ann. Rep. N. Y. State Mus. **28**: 50. 1876).

ably short as compared with the size of the spores. Cystidia and cheilocystidia none. — Hyphae and whole preparation pale yellow in ammonia and KOH, with clamp connections, those of the surface layers of both pileus and stipe not at all gelatinized, those of the hymenophoral trama subregularly arranged (as in *H. coccinea*).

Along the margins of the plantations, gregarious, on earth and humus, fruiting during the rainy season.

Material studied: Huautla de Jiménez, Oaxaca, 12-VII-1957, R. Singer no. M 1531 (LIL, typus).

This species is closely related to the European *H. coccinea* in the sense of Smith & Hesler. This latter species is rare in the United States and has not been observed with certainty in Mexico. It differs from *H. mexicana* in being larger and by a number of less conspicuous characters. The Mexican species has the appearance of and is certainly related with *H. firma* (Berk. & Br.) Sing. (see Fungi Mexicani, Series prima — *Agaricales*, Sydowia **11**: 355. 1957) but differs strictly in not having dimorphic spores or basidia. The spores of *H. mexicana* never reach the sizes observed in *H. firma*. *H. sipiaria* (Berk.) Sing. (*Hygrophorus siparius* Berk. Decad. no. 512, Sacc. Syll. **5**: 413) differs from *H. mexicana* by the same characters as *H. firma* differs from *H. mexicana*, and can be distinguished from all three species mentioned by the white lamellae.

Tricholomataceae.

Marasmiellus subfumosus (Speg.) Sing., Sydowia **9**: 387. 1955.

Collybia subfumosa Speg., Bol. Acad. Nac. Cienc. Córdoba **11**: 390. 1889.

Pileus isabellinous-avellaneous-cinnamomeous, with innately fibrillose but glabrous surface, dry, i. e. not viscid, strongly sulcate-furrowed radially and striate, convex, with or without an obtuse broad umbo, not umbilicate or narrowly depressed in center when old, or exceptionally truly umbilicate, 25—110 mm. broad. — Lamellae whitish, soon palest avellaneous becoming concolorous with the pileus, subclose to crowded, with smooth inter-spaces but eventually becoming rugulose or interveined, narrow, behind eventually moderately narrow, subfree to narrowly adnexed. — Stipe on light fuscous ground sordid-pallid velutinous and thus much paler than the pileus, velutinous layer generally thicker in upper portion of stipe, smooth or long and slightly furrowed longitudinally near apex, long stuffed but eventually (always in mature herbarium specimens) hollow, slightly to distinctly tapering upwards, sometimes flexuous, 30—150 × 4—10 mm.: basal mycelium coarsely cottony-woolly, varying from abundant to scarce and buried in the adhering trash. —

Context white, unchanging, with a strong HCN (*Marasmius oreades)* odor. — Spores 7—9.5 × 3.8—4.8 μ, mostly about 7.5—7.8 × 4—4.2 μ, oblong to ellipsoid or almost subcylindric, smooth, thin-walled, inamyloid, hyaline. — Hymenium: Basidia 29—37 × 7 μ, 2—4-spored, clavate. Cheilocystidia when well preserved making the edge heteromorphous, slightly stramineous, 20—31 × 10—14 μ (measured from last septum), club shaped or cylindric, with cauliflower-like upper portion or with finger-like excrescencies or appendages, occasionally forked. Cystidia on sides of lamellae none. — Hyphae with clamp connenctions, inamyloid; hymenophoral trama subregular, consisting of filamentous somewhat interwoven hyphae, stramineous to subhyaline when mature; trama not gelatinized. Subhymenial elements small and tending to form nodose ramifications especially where reaching the surface at edge or between basidioles.

Covering layer of pileus: Uppermost layer of cuticle at least at maturity distinctly differentiated with Rameales structure (hyphae irregularly nodose-ramified or cauliflower-like, diverticulate, or with cystidioid hyphous outgrowths), pale golden melleous without any incrusting pigment, in lower layers equally free of pigment incrustations, the whole structure basically — a cutis. Dermatocystidia hyaline, erect, usually simple, often cylindric, 23—24 × 4.5—5 μ.

At the base of trunks, in woody humus and on rotten leafmold in the forest, not cespitose, but often gregarious.

Material studied: Mexico: Huautla de Jiménez, Oaxaca, 12-VII-1957, R. Singer no. M 1538 (LIL) — Brazil: São Paulo, holotype (hardly other authentic material), (LPS) — Rio Grande do Sul, Estação São Salvador, 9-XI-1951, R. Singer no. B 115 (LIL).

This species is characteristic for a large group of collybioid (with basal mycelial fibrils) *Marasmielli* and is perhaps the best known of all of them since it was redescribed by Dennis and myself. Nevertheless, a more detailed study of this mainly tropical and subtropical group of species showed that the delimitation of *M. subfumosus* as accepted by me and apparently by Dennis (because of descriptive data at variance with the type, and synonymy) has been too wide, including a number of species which have the same general characteristics such as more or less striped (innately radially fibrillose) pileus colored from pale fawn or avellaneous-isabellinous to cinnamon or fulvous, stipe from slightly longitudinally fibrillose or pruinate to strongly velvety-tomentose all over, habit of medium to large Collybias of the *impudica*-group, spores varying from rather small to rather large and from ellipsoid to oblong-subcylindric, epicutis of pileus with Rameales-structure over a cutis with or without pigment incrustation. This latter character as well as presence or absence of cystidia on the sides of the lamellae, width

and number of lamellae, degree of vestiment on the surface of the stipe, taste and odor, size of carpophores and habit and habitat may serve to differentiate many more species than had been anticipated a few years ago. It is even possible that some species generally taken for *Collybia* will have to be transferred to this group or v i c e v e r s a, the whole of this group would have to be transferred to *Collybia,* an alternative discussed in a recent paper of mine (Mycologia **50**: 1-7-108. 1958).

For a better understanding of the species we consider it necessary to redescribe once more the species we identify with the holotype of *Collybia subfumosa* Speg. This was done above. Furthermore, we wish to add the description of another species of this group, rather widely distributed but apparently undescribed, and likewise occurring in Mexico:

Marasmiellus paurosporus Sing. spec. nov.

Pileo avellaneo vel cinnamomeo, frequenter umbilicato umbilicoque pallido instructo, 15—62 mm. lato, vulgo minore, radiatim innate fibrilloso. Lamellis albis vel pallide alutaceis, confertis vel confertissimis, angustis; sporis in cumulo albis. Stipite colore fundamentali (apice excepto) ei pilei correspondente sed pallidius vellereo, fibrillis mycelialibus basalibus albis vel albidis. Sapore sat ingrato. Sporis 5.3—8.3 × 3—4.8 μ. Cystidiis ad latera lamellarum paucis cystidiolis saepe numerosissimis, basidiolis fusoideis, basidiis saepe sparsis. Epicute pilei elementis nodoso-ramulosis nec non hyphis levibus vel subdiverticulatis dermatocystidiisque erectis formata. Hyphis fibuligeris. Ad basin truncorum in humo nec non ad stipites herbaceas acervatas et ad folia putrescentia intra et extra silvam gregatim nec fasciculatim. Holotypus in herbario LIL conservatus est.

P i l e u s "fawn" to "marron glacé" (Maerz & Paul 14-A-7/8, i. e. fawn color to almost pecan brown), or "Verona brown" (Ridgway), soon with paler ground color and distinctly but innately radially fibrillose-striped, "russet" (Ridgway) or violet brown, when young, and becoming paler on fading, smooth otherwise when young, but eventually sometimes more or less extensively transparently striate when wet, somewhat hygrophanous, glabrous, not viscid, convex, then applanate, with a distinct umbilicus, more rarely with a broad obtuse umbo in age and the umbo sometimes umbilicate, 15—62 mm. broad, usually 18—26 mm. broad. — L a m e l l a e white or whitish, then buffish pallid, or at least becoming so on drying, rather variable in stipe-attachment (subfree to subdecurrent, sometimes on the same cap), at times eventually separating from the enlarged apex of the stipe, narrow or very narrow, close or crowded, not intervenose. — Spore print white or just off white (within "A" of Crawshay scheme). — S t i p e at first whitish at apex and pruinose there, more con-

colorous to cinnamon-chestnut colored below, entirely finely velvety all over, or with an almost scurfy tomentum in older specimens, the covering much paler to almost pallid, often with a slightly enlarged extreme apex, otherwise subequal or equal, with more or less abundant pallid or white basal mycelium, varying from longer than diameter of pileus to very slightly shorter than the latter, often canaliculate, stuffed, eventually (and in mature dried material) hollow, 23—70 × 0.5—2.5 mm. — Context in marginal half of pileus white and thin, flexible, somewhat tough-fleshy, unchanging; odor none or slight and disagreeable, of rotten sauerkraut or *Micromphale foetidum*; taste somewhat disagreeable. — Spores 5.3—8.3 × 3—4.8 μ, mostly around 7—7.8 × 4 μ, hyaline, droplet-shaped to oblong, sometimes almost subcylindric, mostly more or less ellipsoid, smooth, thin-walled, inamyloid, with suprahilar depression or apblanation. — Hymenium: Basidia 21—26 × (4.3)—5—5.8 μ, at first narrowly clavate, then clavate, 4-spored. Cheilocystidia 20—36 × 5.5—12 μ, characteristically club shaped, mostly simple, either entire with one or few knob-, thorn-, or sterigma-like short excrescencies, sometimes all entire, hyaline or subhyaline, making the edge heteromorphous or almost so. Cystidia on sides of lamellae sometimes limited to some cheilocystidium-like bodies near the edge, but mostly differentiated as very rare to scattered pleurocystidia; pleurocystidia 30—36 × 8—14 μ, slightly projecting, hyaline, club-shaped or more often mucronate, fusoid-ventricose or ampullaceous-subcapitate, entire. Cystidioles usually numerous, like basidioles but "empty", Basidia often few. — Hyphae hyaline, with clamp connections, with thin or rather thin walls, inamyloid. Hymenophoral trama regular, consisting of filamentous hyphae, subparallel, not gelatinized, without pigmentation. Subhymenium narrow, of chains of short-elongate to spheric elements arranged perpendicularly to the filaments of the hymenophoral trama. — Covering layers: Epicutis of pileus consisting of a layer of appressed hyphae forming basically a cutis but with rather numerous dermatocystidia (dermatocystidia 12—30 × 4.2—6.5 μ, hyaline, cylindric or irregular, sometimes diverticulate), soon showing islands of Rameales structure, i. e. accumulations of irregularly ascendant forked or diverticulate (irregularly) hyphae, some with brown incrustations, hyaline to stramineous-melleous, but intermittent and interrupted by smooth repent surface hyphae 1.5—15 μ in diameter; underneath epicutis a hypodermium which is a cutis of repent subparallel-interwoven hyphae with distinct brown to deep chestnut colored pigment incrustations which may appear in spirals ("zébrées"), at places somewhat irregular in arrangement when old.

On humus and especially accumulations of dead vegetable matter such as herbaceous stems or rotting leaves of both mono- and

dicotyledoneous plants, either around tree trunks or, at times, far away from trees in fields or pastures or parks and lawns. Gregarious to almost subcespitose in places but generally not fasciculate. Fruiting in the rainy season, in the laboratory at any time.

Material studied: *Mexico*: Oaxaca: Huautla de Jiménez, 12-VII-1957, R. Singer no. B 1533 (LIL, typus). — Bolivia: La Paz: Nor-Yungas, Coroico, 18-II-1956, R. Singer no. B 1255 (LIL). — *Brazil*: Rio Grande do Sul: Caixa do Sul, 2-IV-1958, A. Tocchetto, comm. J. E. Wright, det. Singer (LIL). — Probably also the following two collections: Florida (U.S.A.): Highlands Co., Highlands Hammock State Park, on leaves of *Myrica* around a living trunk of *Myrica* in the "Botanical Garden" area, 2-IX-1942, R. Singer no. F 504 (F). — Argentina: Prov. Salta: Depto. Orán, 2 km. north of the City of Orán on various débris under trees along a road, 17-III-1955, R. Singer no. T 2304 (LIL).

This species varies somewhat as far as the closeness of the lamellae and their width is concerned, also as for habitat and size. Nevertheless, it is one of the narrow-crowded-gilled species of medium size as far as the most usual and typical aspect is concerned. The collection from Brazil was obtained in the laboratory and was growing out of a small trunk of *Prunus persica* which was planted in earth in the laboratory. The peach trees were taken to the laboratory for observation since they were diseased. The collector and phytopathologist of Caixa do Sul believes that the pathogen is the *Marasmiellus* described above. If this were confirmed, *Marasmiellus paurosporus* must be considered as facultatively parasitic and pathogenic as a root parasite on cultivated plants. Since *Prunus persica* is not native in Southern Brazil, it must be assumed that, in this case, the fungus is not very specialized as to host plant and might attack roots of many native plants in their natural habitats.

A remarkable condition has been observed in the Mexican, the Bolivian, the Argentine and, to a certain degree, the Brazilian collection: their sporulation, at all times during the development of the carpophores, was relatively reduced, and the majority of the hymenial elements consisted of basidioles, cystidioles, with very few sporulating basidia or cystidia observable. The species does not produce a spore print except in particularly favorable conditions and in the Florida form.

M. paurosporus differs from the other cystidiate species of the collybioid group of *Marasmiellus* in combining a strong pigment incrustation with medium sized spores (not over 9 μ long). Among the acystidiate species with which it can easily be confused, it comes close to the group *M. domesticus - M. biformis* (with smaller spores and less close lamellae) and to a much larger, stouter species which I tentatively identify with *M. luxurians* although I have not recently

analysed the type of that North American species and do not know whether it has the same type of pigmentation, and the same structure of the hymenium.

Marasmius strictipes (Peck) Sing. Lilloa **22**: 326. 1951.
Collybia strictipes Peck, Ann. Rep. N. Y. State Mus. **41**: 62. 1888.
Gymnopilus strictipes (Peck) Murr., North Amer. Flora **9**: 357. 1916.

Pileus white with stramineous center, later partly pale fulvous or with rusty-fulvous spots or areas, convex, becoming nearly flat, subumbonate or broadly and obtusely umbonate, not viscid, not distinctly hygrophanous, glabrous, smooth but partly reticulate to reticulate-rugose, with entire or lobed margin which is incurved at first, 26—51 mm. broad. — Lamellae white to whitish, crowded, rounded-free or subfree, not intervenose, narrow. — Stipe white, white fibrillose or with pruinate apex, equal or subequal (at times with slightly thickened base and/or apex), hollow, 47—88 × 1.5—4.5 mm., usually straight, with basal (white) tomentum, with connate bases. — Context white or whitish, unchanging; odor of crabs or crayfish, mixed with odor of *Marasmius oreades* (HCN). — Spores 7.5—8.5 × 3.8—5 μ, mostly 8.3 × 4—4.8 μ, ellipsoid to oblong, smooth, hyaline, inamyloid. — Hymenium: Basidia 23—28 × 5.5—8 μ, 4-spored, hyaline, clavate. Cystidia none. Cheilocystidia stramineous, irregular, filamentous to cylindric-flexuous or cylindric-subclavate, e. gr. 26—28 × 2—5 μ. — Hyphae hyaline, with clamp connections, with thin walls, except for some individualized filamentous thick-walled and strongly amyloid (pseudoamyloid) elements which have the appearance of the epicuticular hairs of *Crinipellis* (here walls 1—1.3 μ diam. for a total diameter of 2.5—4.5 μ), somewhat less but still extremely rapidly and very strongly mahogany-red in Melzer's reagent in hymenophoral, pileus- and stipe-trama. Hymenophoral trama regular, its hyphae filamentous to slightly tickened (4—10 μ diam). — Covering layer of pileus: Uppermost layer of the pileus consisting of erect hymeniformly arranged hyaline elements which vary from subglobose to clavate-vesiculose, entire, thin-walled, not intermixed with dermatocystidia.

On rotting leaves of Dicotyledones, especially dicot trees, in the original forest vegetation (with *Quercus, Carpinus,* etc.) growing cespitosely during the rainy season, or in the summer-fall season in mixtures of decayed wood and foliage in deciduous woods.

Material studied: New York (U.S.A.), type (NYS). — Mexico: Oaxaca: Huautla de Jiménez, 1500 m. alt., 10-VII-1957, R. Singer no. M 1510 (LIL).

The description given above is based exclusively on Mexican material.

Marasmius oaxacanus Sing. spec. nov.

Pileo albo, centro obscuriore, 3—4 mm. lato. Lamellis decim vel tredecim, albis, collariatis. Stipite nigro, glabro, insititio. Sporis 10.8—11.2 × 3—4 μ; cystidiis nullis; epicute hymeniformi, cellulis hyalinis, minute divergenter hyalino-setulosis. Hyphis amyloideis. Ad folia Ingae, Oaxaca, Mexico. Typus in LIL conservatur.

Pileus white excepting the umbilicus where it is fuscous to pale fuscous when fresh and pale fuscous to pallid when dried, opaque and glabrous when fresh and seen macroscopically but when dried and under a strong lens appearing subtomentose, convex, umbilicate, smooth with sulcate margin, 3—4 mm. broad. — Lamellae white with white edges, broad, distant (10—13 lamellae present), equal, not intervenose, not or rarely forked, broadly adnate to a distinct collarium which is quite free from the stipe. — Stipe black except on the apex which is hyaline to white, glabrous, smooth, horse-hair-like, somewhat shining, insititious, 20—30 × 0.2—0.4 mm. — Context extremely thin, white in apex of stipe and under umbilicus, inodorous. — Spores 10.8—11.2 × 3—4 μ, mostly 11 × 3.5 μ, hyaline, smooth, fusiform, inamyloid. — Hymenium: Basidia 16—17 × 7 μ. Cystidia none. Cheilocystidia quite like the broom cells of the epicutis of the pileus. — Hyphae hyline, thin-walled, strongly amyloid in all parts, with clamp connections. — Covering layer of pileus consisting of a hymeniform or subhymeniform layer of hyaline cells, these cells vesiculose to vesiculose-cylindric, very often globose or subglobose, beset with small hyaline setulae which are divergent and project about 1.3 μ, diamater of cells 16—22 μ.

On fallen dead leaves of *Inga* in shaded place, singly but gregarious, fruiting in the rainy season.

Material studied: Oaxaca: Huautla de Jiménez at 1500 m. 10-VII-1957, R. Singer no. M 1519 (LIL, typus).

This species reminds one of the various small species related to *Marasmius rotula*. It would key out with *M. peckii* Murr. with which it has many things in common as far as the original description is concerned. The only difference is in size and number of lamellae (*M. peckii* being still smaller with fewer lamellae). On the other hand, A. H. Smith (Contrib. Univ. Mich. Herb. **1**: 27. 1939) has studied the type and come to the conclusion that this species „is corticated by clavate cells with the apices covered by coarse brown-walled echinulations. Both the pileus and gill trama become yellowish brown in iodine". Smith does not seem to be certain about the spores which were doubtfully indicated as measuring 5—6 × 4—5 μ. Since the epicuticular broom cells cannot be called coarsely brown-echinulate (a description which would much rather indicate a species

with *Siccus*-type broom cells) in *M. oaxacanus,* we do not believe that the latter is identical with *M. peckii.* The iodine reaction of the type, if correctly observed, would indicate a much weaker positive reaction in *M. peckii* than in *M. oaxacanus.*

R. W. G. Dennis (Trans. Brit. Mycol. Soc. **34**: 418. 1951) has collected what he considers identical with the type of *M. peckii* and which he compared with the type specimen, giving a revised description of the species in his interpretation. His fungus has also only eight lamellae; the spores are indicated as 7—10 × 3.5—5 µ. The pileus, although, according to Dennis, it may be as large as 5 mm. in diameter, is described as entirely colored clay color. The lamellae are indicated as narrow. The differences in the hymenophore, the shorter spores and the more abundant pigment make it impossible to identify the Mexican species with Dennis's interpretatuon of *M. peckii.*

Mycena pearsoniana Dennis in Sing. spec. nov.

A *Mycena pura* differt lamellis adnato-subdecurrentibus, statura minore, sporis inamyloideis. A *Mycena violacella*[3]) differt lamellis minus anastomosantibus nec non odore forti raphanaceo. Ab ambobus differt sporis minoribus. Sub Abiete. Typus in LIL conservatus est.

Pileus in the color of *M. pura,* otherwise also like that species, but slightly smaller. — Lamellae in the color of *M. pura,* not or little anastomosing, adnate-subdecurrent, subclose, broad. — Stipe in the colors of *M. pura*, otherwise also like that af that species, but slightly smaller. — Context slightly paler than the surfaces, unchanging, with a strong odor of radish. — Spores 5.5—7.2 × 4—4.8 µ, smooth, ellipsoid, hyaline, inamyloid. — Hymenium: Basidia 23 × 6.8 µ, clavate, hyaline, 4-spored. Cystidia none. Cheilocystidia 45—65 × 7—13 µ, ventricose, broadest in lowest third, sometimes mucronate at apex, or ampullaceous and then with subcylindric or slightly thickened apex, subcylindric, etc., always with rounded-obtuse tip, very slightly (pale) colored to hyaline, inamyloid. — Hyphae with clamp connections, distinctly amyloid. Cells of hymenophoral trama broad. — Covering layer of pileus: Epicutis consisting of filamentous hyphae which are hyaline, repent, smooth, inamyloid (at least in the outermost layer). Hypodermium, consisting of very broad, often almost subisodiametric elements which are arranged in a cutis, amyloid, not gelatinized.

On humus in *Abietetum religiosae* (coniferous woods with *Abies religiosa* predominating) and probably generally in coniferous and mixed woods in small groups, sometimes in company of *Mycena pura,* summer-fruiting.

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[3]) *Mycena violacella* (Speg.) Sing. comb. nov. (*Collybia violacella* Speg., Bol. Acad. Cienc. Cordoba **11**: 393. 1889).

Material studied: Mexico: East slopes of Popocatépetl at ± 3000 m. altitude, 21-VII-1957, R. Singer no. M 1606 (LIL, typus).

This species is undoubtedly different from both *M. pura* and *M. kuehneriana* A. H. Smith [4]) since the spores are somewhat smaller than in the former, and inamyloid. The species with inamyloid spores described by Kühner has no valid name since Pearson (Trans. Brit. Mycol. Soc. **35**: 101—102. 1952) has shown that the type (K) of *Agaricus pseudopurus* has amyloid spores. I do not share Smith's opinion that the species with inamyloid spores and the American types of *M. kuehneriana* are probably conspecific. Consequently, a new name had to be proposed for this species whereby I have preferred to base it on my own type. Pearson was the first to suggest that Kühner's species will be in need of a new name, and Dennis, in an unpublished manuscript of which he has kindly sent me a copy, has proposed the name *M. pearsoniana* which I am using in the present paper.

Kühner (Encycl. Mycol. **10**: 451—453. 1938) indicates that the basidial walls are amyloid. We found the basidia (as in all similar species) inamyloid. The specimens from Mexico became rapidly leather colored in the herbarium and the stipe is now brown. This coincides well with the description originally given by Cooke and, as long as the iodine reaction of the spores of the type was unknown, the interpretation proposed by Kühner was not unjustified.

Forms which are, like the one described here as *M. pearsoniana*, intermediate between *Mycena* and *Poromycena* can also be found in South America; therefore, I have already indicated (Mycologia **45**: 886. 1953) that the genus *Poromycena* is untenable.

Strophariaceae.

Psilocybe zapotecorum Heim, Rev. de Mycol. **22**: 77. 1957.

Pileus reddish brown (café rojizo), glabrous, not viscid, conic to campanulate with a sharp acute papilla, sulcate over half the radius of the pileus 8—26 mm. broad, 10—25 mm. high. —

[4]) The status of *M. kuehneriana* may be not fully clear from a purely nomenclatorial point of view. Undoubtedly because of a mistake in editing, the Latin diagnosis is a literal translation with certain omissions of the text of Kühner's description of *M. pseudopura*, with exception of the iodine reaction of the spores which are given as "amyloideae". On the other hand, the type designated by the author is a specimen from North America with amyloid spores. Did Smith intend to give a new name to *M. pseudopura* sensu Kühner, but proposed a new American type? Or did he intend to describe a new species? I have assumed that the latter is the case, and have accepted Smith's species on the strength of the type concept, taking the diagnosis as partly erroneous.

Lamellae deep coffee color to blackish, close to medium close, narrow (here about 3 mm. broad), adnate or adnexed, eventually appearing sinuate-subfree but merely separating. — Stipe brownish red, assuming bluish tones or white in part, equal, or in the larger specimens subbulbous below and, if not, at least tapering gradually upwards, hollow, 40—72 × 1—4 mm., bulb reaching 5 mm. in diameter. — Context with farinaceous odor. — Spores 6.8—7.5 × 4.8—6 × 4—4.8 μ, heart shaped, rounded-rhomboid, when seen in profile appearing elliptical in outline, smooth, dusky melleous-brown, walls complex, germ pore broad. — Hymenium: Basidia 20.5—21 × 6.8 μ, clavate, subcylindric, or slightly constricted in the middle, mostly 4-spored, few 2-spored. Cystidia 29—35 × 8—8.5 μ, almost constandtly thickened-ventricose below and above with a constriction (diameter 5—6.5 μ) in the middle, upper thickening reaching 6—7.5 μ in diameter, all hyaline but varying between opaque and diaphanous, smooth, at times brownish in lower portion, rounded-obtuse at tip, deeper rooting than basidia and very frequently visibly projecting beyond them, rather numerous. Cheilocystidia 23—33 ± 4.7—6.2 μ, ampullaceous, ventricose below, but not very broad there and very thin above, apex 1—2 μ in diameter, acute or rounded-capitate (in the latter case capitulum 2—4 μ diameter), or obtuse and filamentous-equal, hyaline, very crowded and making the edge broadly heteromorphous, length of apex 11—13 μ. — Hyphae with clamp connections. Hymenophoral trama regular. — Covering layers of pileus: Epicutis consisting of two layers, boh consisting of narrow (1.5—8 μ diameter) hyphae which form a nongelatinous cutis; uppermost layer hyaline to subhyaline, and not or very little pigmented, hyphae 1.5—4 μ in diameter, dermatocystidia none; lower layer (which may as well be considered the upper layer of the hypodermium) strongly pigmented by a brown incrusting pigment and hyphae up to 8 μ in diameter. Hypodermium proper conspicuously subcellular in places, with very short (e. gr. 55 × 35 μ) large elements, strongly incrusted by brown pigment.

In swampy places in tropical-montane vegetation, rare.

Material studied: Oaxaca: San Agostín Loxicha, 23-VI-1958, Gastón Guzmán. Huerta no. SA 1501 (LIL, part in Instituto Politécnico, México D. F.).

This material which, for all practical purposes, must be considered a topotype, was kindly sent to me by Señor Guzmán with accompanying notes and drawings. This makes it possible to provide a new description of this species, completely based on Guzmán's and my own observations. It will be noted that these specimens are of smaller average size than those collected by Heim. However, there can hardly be any doubt but that it is the same species. It was used by the Zapotec population, according to G. Guzmán, as a

hallucinogenic mushroom. He reports the native names: „razón giól", „razón viejo", „hongo de la razón" which are evidently translations of Zapotec names into Spanish. The collector also indicated the following observation about the fructification of this species: The carpophores grow by flashs (as the cultivated Mushrooms), many individuals appearing at once and then disapear.

We (Singer & Smith, Mycologia **50**: 266, 298. 1958) have included *P. zapotecorum* into our monographic treatment of the section *Caerulescentes* on the basis of Heim's published data. As can be seen by a comparsion of Heim's and the present description, the anatomical part of the former is rather incomplete, and therefore we have done well not to „judge its final relationships without having had a chance to study specimens" „It might conceivably ... represent a stirps of its own." It seems to me now that, indeed *P. zapotecorum* should enter a stirps of its own intermediate between stirps *Mexicana* and stirps *Caerulescens*. It is more mycenoid and acute than even *P. aggericola* and thus, by its habit, approaches stirps *Mexicana* and separates itself from stirps *Caerulescens* while on the other hand it has more compressed spores than *P. mexicana* and is larger than that species with an involute margin in the young stage.

Psilocybe caerulipes var. **gastonii** Sing. var. nov.

Pileo sordide flavido, campanulato, velo appendiculato, ceterum glabro nudoque, levi, viscido, margine primitus subinvoluto. Lamellis moderate latis, confertis, Stipite albo, vitreo, carne caerulescente. Sporis 7—8 × 5.5—6 × 4.2—4.8 μ, compressis, lentiformibus; cheilocystidiis typi eorum *P. isauri* praesentibus; pleurocystidiis nullis. Epicute pilei pelliculosa gelatinosa lata. Ad truncum putridum in silva Liquidambaris. Typus in herbario LIL conservatur.

Pileus dull yellowish, viscid, smooth, glabrous except for veil remainders, campanulate, subacutely papillate, about 15 mm. broad when dried; margin almost involute when young; veil appendiculate when fresh. — Lamellae sepia, with pallid edges, medium broad, subascendant, adnate to adnato-subdecurrent, close but not crowded. — Stipe white, fleshy, transparent-glassy when fresh, slightly tapering upwards, about 70 × 3 mm.; annulus none.

Context pallid, fleshy, bluing when injured. — Spores (6)—7—8—(9.5) × (4.2.)—5.5—6 × 4.2—4.8 μ, distinctly compressed lentiform as in *P. zapotecorum* but somewhat less strongly so, with rounded convexities, with broad distinct germ pore, with complex wall, deep brown-olive in KOH, smooth, elliptical when seen in profile. — Hymenium: Basidia 15 × 6.5 μ, 4-spored. Cystidia none. Cheilocystidia as in *P. isauri*, also hyaline, ventricose, long-pedicellate in some individuals, with cylindric or subacute apex, 12—24 × 4—7 μ,

apex 1.2—2 μ thick, making edges heteromorphous; a resinous incrustation — also sometimes observed in *P. zapotecorum* — forming a small hood on the apex of some cheilocystidia which then seem to be subcapitate. — Hyphae with clamp connections; hymenophoral trama regular, very moderately thick-walled (wall 0.5 μ diameter) in places, brownish-hyaline, not pigment-incrusted, somewhat glassy but not cruly gelatinous. — Covering layer of pileus: Epicutis — a broad pellicle consisting of very thin wavy-spirally repent hyphae which are imbedded in a hyaline abundant gelatinous mass and are themselves hyaline. Hypodermium — a cutis formed by non-gelatinized hyphae which are somewhat broader than those of the epicutis, somewhat shortened and broadened in places, but not forming a subcellular layer like in old *P. zapotecorum,* hyphal walls distinctly but not strongly brown pigment-incrusted.

On rotten trunk in a sweet gum forest (*Liquidambar styraciflua*) in the tropical-montane zone.

Material studied: Oaxaca, Huautla de Jiménez, 13-VII-1958, Gastón Guzmán Huerta no. GH-1128 A (LIL, part of collection also at the Instituto Politénico, México D. F.). The LIL portion is the holotype.

This variety differs from *P. caerulipes* var. *caerulipes* in marginal veil, presence, in some caps, of an acute papille, white glassy stipe, perhaps paler pileus. It may be a geographical race of the Eastern North American species. It grows together with *P. isauri.* Nothing definite is known about its hallucinogenic properties. It is perhaps sometimes gathered together with the following species and used the same way as *P. isauri.* It belongs in stirps *Caerulipes.*

Psilocybe Isauri Sing. spec. nov.

Pileo ita ut *P. caerulescens* colorato sed nonnihil pallidiore, glabro, sulculato, haud viscido, conico-companulato, acute papillato, 11—18 mm. lato, margino primitus subtiliter incurvato; velo nullo. Lamellis angustissimis, confertissimis. Stipite cupreo ut in Panaeolo sphinctrino (sensu Linder, Singer), haud vitreo, glabro vel subglabro, aequali vel basi incrassato. Carne caerulescente. Sporis 4—6.5 × 3.5—5.2 × 3—3.5 μ, rhmboideis, subangulatis. Cheilocystidiis fusoideis vel ampullaceis pedicellatisque, 16—25 × 3.7—5.2 μ; cystidiis praesentibus sed vix conspicuis. Epicute pilei haud gelatinosa. Ad truncos putridos in silva Liquidambaris. Typus in LIL conservatus est.

Pileus with the general color of *P. caerulescens* but somewhat paler, conic to campanulate and acutely papillate, glabrous, in fresh condition over one third of radius sulculate, dried much further inwards sulculate, not viscid, 11—18 mm. broad and 10 or more mm. high; margin at first slightly incurved; veil none. — Lamellae

whitish at first, eventually sepia to deep purple brown, very narrow, very crowded, ascendant or subascendant, with pallid edges, adnate, subsinuate-adnate, or adnate-subdecurrent. — Stipe copper red as in *Panaeolus sphictrinus* (in the sense of Linder and the author, same as *Panaeolus campanulatus* of some authors), not transparent or glassy, glabrous or subglabrous, equal or with slightly thickened base, 25—60 × 1.5—2.5 mm.; no trace of a veil; basal mycelium white. — Context whitish in young pileus, injured bluing. — Spores 4—6.5 × 3.5—5.2 × 3—3.5 μ, mostly 5.3—5.7 × 4.3—4.5 × 3.3 μ, strongly rhombic in outline when seen frontally, often almost angular, elliptical in profile, with distinct broad flattened germ pore, brownish olive, at full maturity deep sepia brown, smooth, with very thick complex wall. — Hymenium: Basidia 11—12.5 × 3.8—5 μ, (2)-4-spored, clavate. Cystidia on sides of lamellae not very conspicuous and discovered usually by the thin resinous hyalinie apical incrustation, versiform, often clavate or ampullaceous, 18—25 × 5.5—10.5 μ, often rather deep-rooting, often opaque at apex because of the incrustation but otherwise thin-walled and transparent. Cheilocystidia making the edge heteromorphous, crowded, 16—25 × 3.7—5.2 μ, fusoid to ampullaceous and pedicellate, hyaline, apex often with hyaline opalescent thin resinous incrustation, under it thin-walled, transparent, about 10—11 μ long, more rarely shorter, tapering to a rounded but thin tip or else cylindric and obtuse, 1.3—2 μ thick. — Hyphae: melleous hyaline to light melleous, not incrusted except in covering layers, with clamp connections. Hymenophoral trama regular. Hyphae of pileus trama radially arranged. — Covering layers of pileus: Epicutis inconspicuous, consisting of a cutis of hyphae, these hyphae non-gelatinized, subhyaline, narrow, parallel, poorly differentiated from the hypodermium; scattered dermatocystidia present, hyaline, erect, same size and shape as the cheilocystidia. Hypodermium — a cutis formed by hyphae which are parallel or subparallel with each other, not subcellular in any place, strougly brown from an incrusting membrana-pigment.

On a rotten trunk of *Liquidambar styraciflua* in the tropical-montane zone, fruiting in summer (rainy season), cespitose-fasciculate.

Material studied: Oaxaca: Huautla de Jiménez, 13-VII-1958. Gastón Guzmán Huerta no. GH-1128 (LIL, holotypus; there is syntype material at the Instituto Politécnico, México, D. F.).

This species is the one mentioned by Isauro Nava (and now named for him) in 1957 and was recognized by him in 1958 as the „pajarito del bosque" (birdie of the woods), hallucinogenic mushroom of the Mazateco country. The name is best explained by the notes published by me in Mycologia **50**: 244—245, 1958 „Isauro Nava ... said that there was, growing at a certain distant locality, and not

fruiting at the time of our visit, another hallucinogenic mushroom, as small as „pajaritos“ (*Psilocybe mexicana*) and of the same shape and also staining blue, but differing in its habitat — wood in the forest rather than soil of meadows. Just such a species (*Ps. yungensis*) had been collected by me earlier in the ecologically very similar Bolivian Yungas, also a tropical-montane forest ...“ This interpretation of the „pajaritos del bosque“ has been corroborated in every detail by Guzmán's collection described above as *P. isauri.* This species is indeed a *Psilocybe* of the section *Caerulescentes,* and even belongs in the stirps *Yungensis* as anticipated by me. This is a further addition to the number of hallucinogenic Mexican mushrooms already known in 1958 and again belonging in the same section. The Mazateco name for *P. isauri is* not known to me, but the Spanish „pajarito del bosque“ (or „pajarito del monte“ as Isauro Nava called it sometimes, and which means the same thing) is evidently a literal translation of the Mazateco words. They refer to the name the Mazatecs have for *Psilocybe mexicana* (which grows in open places) and emphasizes the different habitat.

Psilocybe caerulescens Murr., Mycologia **13**: 20. 1923.

Psilocybe mazatecorum Heim, C. R. Acad. Sc. **242**: 1392. 1956, nom. subnud.

Psilocybe caerulescens var. *mazatecorum* Heim, Rev. Mycol. **22**: 78. 1957.

Psilocybe caerulescens var. *nigripes* Heim, C. R. Acad. Sc. **244**: 698. 1957, nom. subnud.; Rev. Mycol. **22**: 79. 1957.

A collection by Gastón Guzmán Huerta from Huautla de Jiménez, Oaxaca, 10-VII-1958 coincides well with what Heim has described as *Psilocybe caerulescens* var. *nigripes* Heim. Isauro Nava, whom we have to thank for so many interesting and always dependable informations, calls this form „Derrumbe negro“, in other words the black *Psilocybe caerulescens,* which immediately suggests Heim's variety.

However, the difference between this form and the type of *P. caerulescens* (called var. *mazatecorum* by Heim) is rather problematic and more apparent than real. Macroscopically, this form is somewhat more slender (at least in Guzmán's collection) than the average *P. caerulescens* in Huautla, and the blackening of the stipe progresses soon and rapidly. The stipe is also, as was noticed by both Heim and Guzmán more regularly cylindrical in var. *nigripes* than in the typical form. However, the color of the pileus as indicated by Heim is not unusual in typical *P. caerulescens* and is merely an individual lusus, perhaps based on physiological conditions of every single carpophore of a population. I have studied

carefully the microscopical characters of Guzmán's collection (GH-1107, LIL) and cannot say that I discovered any significant difference there. The „chemical" difference of the stronger blackening of the stipe may have something to do with the individual texture and shape of the stipe and its development in each carpophore, but I do not believe that it is a genotypical character. Summing it up, I believe that var. *nigripes* might, at best, be listed as a *forma.*

Note: At about the time when A. H. Smith and I published our „Mycological investigations on teonanácatl" cited above, two species of the section *Caerulescentes* of the genus *Psilocybe* were discovered and described by Tsuguo Hongo. One of these is *Psilocybe subcaerulipes* Hongo (Journ. Jap. Bot. **33**, no. 2: 44. 1958) which I have not studied but which is rather fully described by its author, and, according to these data, belongs in stirps *Zapotecorum.* Nothing is known about its physiological properties. The other species, *Psilocybe fasciata* Hongo (Journ. Ja. Bot. **32** no. 5: 144. 1957, redescribed in Mem. Fac. Lib. Arts & Educ. Shiga Univ. **7** (2): 43. 1957) is apparently near *P collybioides* Sing. & Smith (stirps *Cyanescens*).

The species enumerated above represent quite a substantial addition to those already treated in Singer & Smith, Mycological investigations on teonanácatl, the Mexican hallucinogenic mushroom. Part II. A taxonomic monograph of *Psilocybe,* section *Caerulescentes,* Mycologia **50**: 262—303. 1958. Consequently, I shall here add a new key to the section *Caerulescentes.* The species with an asterisk are used as hallucinogens in Mexico, or known to cause poisonings with hallucinatory symptoms:

A. Annulus typically membranous and persistent . . . . . B.
  B. Spores smaller . . . . . C.
  B. Spores 11.5—17.3 μ long *P. cubensis**
    C. Growing on wood; pileus viscid *P. aerugineomaculans*
    C. Growing on dung; pileus merely moist.
      *P. subaeruginascens**
A. Annulus, if present, merely a zone of fibrils, or very fugacious . . . . . D.
  D. Spores 4—6.5 × 3.5—5.2 × 3—4 μ, strongly compressed, frontally often rhomboid; pileus acute; stipe not whitish. On wood and woody humus in forests . . . . . E.
    E. Mexican species with glabrous or subglabrous stipe
      *P. isauri**
    E. South American species with densely fibrillose-floccose stipe
      P. yungensis
  D. Spores larger, or not combining all the characters enumerated above . . . . . F.
    F. Margin of pileus straight when young or almost so; habit mycenoid or nearly so . . . . . G.

G. Spores compressed (broader in face than in side view); growing in open places, meadows, fields, swamps etc. H.
H. Spores generally not more than 8 μ long; carpophores not thin and fragile; often in swampy areas or among moss and grass see „K" below.
H. Spores generally more than 8 μlong; carpophores thin and fragile; in fields and pastured meadows. *P. mexicana**
G. Not so; in temperate woods *P. silvatica* and *P. pelliculosa*
F. Margin of pileus distinctly incurved when young; habit typically collybioid . . . . . I.
I. Spores typically less than 9 μ long . . . . . J.
J. Stipe white, basal half scabrous-strigose, upper half strongly floccose from veil *P. candidipes**
J. Not combining the above characters . . . . . K.
K. Spores 6—6.5 × 3.5—4 μ. Asiatic (Japan) species *P. subcaerulipes*
K. Majority of mature spores generally larger. American species . . . . . L.
L. Veil on stipe copious and flocculose in young specimens; not growing on wood or in swamps. . . . . M.
M. Spores in profile 5—6 μ broad; stipe whitish when young *P. caerulescens**
M. Spores in profile 4—5 μ broad; stipe colored when young *P. aggericola*
L. Veil thin, cortinate, fugacious; sometimes growing on wood, but also in swamps or on earth in open places . . . . . N.
N. Pileus not viscid. Not on wood . . . . . O.
O. Spores terete or up to 0.3 μ broader in frontal view than in profile. *P. muliercula**
O. Spores more compressed *P. zapotecorum**
N. Pileus viscid. Often growing on wood of *Betula, Acer, Liquidambar,* and other frondose trees. *P. caerulipes*
I. Spores typically more than 9 μ long . . . . . P.
P. Lamellae pallid to white, or brownish only at maturity — sterile to partly sterile collections of *P. collybioides* key out here.
P. Not as above . . . . . Q.
Q Stipe whitish; pileus milk white or disc merely ochraceous *P. aztecorum**
Q Stipe or pileus or both more deeply colored . . R.

R. Pileus chestnut color; spores slightly compressed *P. cyanescens*

R. Not combining these characters . . . . . S.

S. Cheilocystidia 20—30—(36) × 4—6 μ, apex 1.2—1.5 μ in diameter *P. baeocystis*

S. Cheilocystidia either longer or broader, or both . . . . . T.

T. Odor distinctive (farinaceous, raphanaceous or spermatic). American and African collections of *P. collybioides*

T. Odor none or not distinctive. Taste mild. . . . . U.

U. Stipe 100—130 mm. long, straight. *P. strictipes*

U. Stipe up to 70 mm. long . . . . . V.

V. Spores 9.5—11 × 5—6 μ. Asiatic species *P. fasciata*

V. Spores 11—13.5 × 5.5—7 μ. African species *P.* cf. *collybioides*

(*Hypholoma cyanescens*)

Rhodophyllaceae.

Rhodocybe gilvoides (Rick) Sing.[5]) var. **convexa** Sing. var. nov.

A varietate typica differt pileo convexo nec infundibuliformi. Typus varietatis convexae in herbario LIL conservatur.

Pileus pale flesh brown to light ochraceous cinnamon, hygrophanous, fading to a much paler color, the extreme margin sometimes crenate, the marginal zone weakly sulcate in old specimens, otherwise smooth, not viscid, glabrous, not depressed anywhere, neither umbilicate nor umbonate, convex, not becoming applanate, 23—37 mm. broad. — Lamellae pale cinnamon, cinnamon pallid, not whitish, arcuate, decurrent, broad, distant, some forked. — Stipe paler than the pileus, solid, then stuffed, glabrous and smooth, not hollow, solid at first, later becoming stuffed, not viscid, irregular in shape, more or less subequal or somewhat ventricose, 40—55 × 4—7 (apex), 7 (base) mm. — Context pallid to (in pileus) concolorous with surfaces; odor of *Marasmius oreades*; taste mild to slightly astringent. — Spores 4.8—6.3 × 2.8—4.2 μ, short-ellipsoid to oblong, not cylindric, ovscurely subangular to smooth, mostly distinctly angular when seen from one pole, not quite hyaline. — Hymenium: Basidia 6—7 μ broad, clavate, 4-spored. Cystidia,

[5]) *Rhodocybe gilvoides* var. *gilvoides* is based on *Clitocybe gilvoides* Rick from Southern Brazil, This was analysed by Singer (Lilloa **26**: 70. 1953) and transferred to *Rhodocybe* (l. c. p. 71).

pseudocystidia none. Cheilocystidia not making the edge heteromorphous, 1.5—3.5 μ in diameter, filamentous, more or less projecting, rather numerous but scattered, hyaline, smooth, rarely one forked. — Hyphae: without clamp connections. — Covering layer of pileus: Epicutis and hypodermium both formed by repent hyphae which are parallel and form a cutis, hyaline to stramineous, without any incrusting or otherwise striking pigment.

In coffee plantation on rotting piece of log.

Material studied: Oaxaca: Huautla de Jiménez, 10-VII-1957. R. Singer, no. B 1511 (LIL, typus varietatis).

This variety, if found constantly enough in its area might well represent a geographic race. If and when the range of variability of both type variety and var. *convexa* are more closely studied, the Mexican form may even be considered a species; on the other hand it may turn out to be distributed over the whole area from Brazil to Mexico or even further and be no more than a striking new form differing in a single character, that of the shape of the pileus which is infundibuliform in the var. *gilvoides*.

Supplement: Corrections in part I Sydowia XI: 354—374. 1957.

The first paragraph of p. 354 should read: "During my various trips in Central and Southern Mexico and in my type studies on Basidiomycetes originating in Mexico, a number of notes on Mexican *Agaricales* has accumulated so that now I am in a position to give a list of species of fungi, in this first series all *Agaricales,* mostly new for Mexico ..." The phrase in italics was omitted.

No. 2 (p. 355) should read *Hygrocybe firma* (Berk. & Br.) Sing. var. *firma,* and the synonym *Hygrophorus firmus* Berk. & Br. var. *typicus* Corner, Trans. Brit. Mycol. Soc. **20** (2): 176. 1936. In the text to be corrected, "Berk. & Br." was reemplaced by "Corner", the word omitted after "var. *typicus*".

No. 15 (p. 361) should read *Copelandia cyanescens* instead of *Copelandia caerulescens.*

No. 27 (p. 305): The last paragraph was omitted. It reads:

On mosses over rotten *Abies* trunk, 3000 m. alt., 21-VII-1957. Road from San Pedro de Nexapa to Paso de Cortés. R. Singer no. M 1565 (MICH).

No. 34 (p. 370): The last paragraph was likewise omitted. It reads:

On dead dicotyledoneous wood in the forest, 10-VII-1957. Huautla de Jiménez, Oaxaca. R. Singer M 1516 (MICH).

Über die Hauptfruchtform von Phyllostictina Solieri (Mont.) Petr. et Syd.

Von Emil Müller.

(Aus dem Institut für spezielle Botanik der Eidg. Technischen Hochschule, Zürich.)

Mit einer Textabbildung.

Die von Sydow (1916) begründete und später vor allem von Petrak und Sydow (1927) erweiterte Imperfektengattung *Phyllostictina* umfasst Sphaeropsideen mit einzelligen, hyalinen Konidien, welche in ihrer typischen Ausbildung eine verschleimende Wand besitzen. Charakteristisch für die in der Gattung eingereihten Pilze ist vor allem die Fruchtkörperentwicklung, deren Ablauf ebenfalls von Petrak und Sydow (1927) ausführlich dargestellt wurde. Die Konidienbildung beginnt rund um eine zentrale Höhlung im Fruchtkörper. Aus den diese umgebenden Zellen wachsen kurze Träger hervor; nach der Abschnürung einer einzelnen Spore lösen sich Nährzelle wie auch Träger auf, worauf die nächste Schicht Zellen zur Fruktifikation schreitet.

Von einigen *Phyllostictina*formen ist bekannt, dass sie in den Entwicklungszyklus von Ascomyceten aus den Gattungen *Botryosphaeria* Ces. et de Not. [z. B. *Botryosphaeria foliorum* (Sacc.) v. Arx et Müller] und *Guignardia* Viala et Ravaz [z. B. *Guignardia Bidwellii* (Ell.) Viala et Ravaz] gehören (vgl. auch Müller, 1957). Die meisten zur Gattung gestellten Arten können aber noch nicht mit irgend welchen Ascomyceten in Beziehung gebracht werden.

So fehlten auch für die auf *Asphodelus*-Arten vorkommende *Phyllostictina Solieri* (Mont.) Petr. et Syd. Anhaltspunkte, die es uns ermöglichen würden, den Pilz in den Entwicklungskreis eines Ascomyceten zu stellen. Im Frühsommer 1956 sammelte ich nun Material des Pilzes am Monte Generoso im südlichen Tessin. Neben den unverkennbaren Pyknidien der *Phyllostictina Solieri* fanden sich — mit genau gleich gebauten Gehäusen — die Fruchtkörper eines Ascomyceten, dessen Asci je acht hyaline, nahe dem untern Ende septierte Sporen enthielten. Dem innern Bau nach entspricht dieser Pilz der Gattung *Mycosphaerella* Joh., unterscheidet sich aber durch den beschriebenen Sporentyp von den zahlreichen bekannten Arten dieser Gattung. Auch ist bei *Mycosphaerella* Joh. kein Fall bekannt, in dem eine Art aus der Imperfektengattung *Phyllostictina* in den Entwicklungszyklus gehörte. Wir wissen nur von *Didymella* Sacc., dass dort

manchmal Pyknidien mit einzelligen Sporen auftreten können, die aber meist zu *Phoma* Fr. oder *Phyllosticta* Pers. gestellt wurden, sofern nicht — wie dies häufig beobachtet wird — nicht noch in geringer Zahl auch zweizellige Sporen auftraten; in diesem Fall stellte man diese Formen zu *Ascochyta* Lib. Leider ist von diesen Formen die Entwicklung nicht in jedem Fall untersucht worden (vgl. Corbaz, 1956); es ist deshalb nicht bekannt, ob nicht einzelne Arten sich wie *Phyllostictina* Syd. entwickeln.

Dank der Arbeit von Corbaz (1956) sind wir heute über die Gattung *Didymella* gut orientiert. Er hat sich bemüht, die Entwicklungszyklen und die Varibilität einer ganzen Anzahl von Arten zu untersuchen. Dabei hat er festgestellt, dass es einige Formen gibt, welche ungleich geteilte Sporen besitzen: *Didymella alectorolophi* Rehm, *Didymella eupyrena* Sacc., *Didymella inaequalis* Corbaz, *Didymella obstruens* Corbaz und *Didymella macrospora* Corbaz. Bei keiner dieser Arten ist aber das Verhältnis zwischen den Zellängen derart weit wie im vorliegenden Fall, doch kann unsere Art unbedenklich zu *Didymella* gestellt werden, da gleitende Übergänge zu den Zellformen mit mittlerer Septierung bestehen.

Da keine entsprechende Beschreibung eines derartigen Pilzes gefunden wurde, betrachte ich die Art auf *Asphodelus* als neu. Sie sei nachfolgend beschrieben:

Didymella asphodeli nov. spec.

Perithecia globosa, 120—180 μ diam. fusca, solitaria, dispersa, substrato immersa in parte superiore crassioria demum canale cylindraceao aperta. Paries peritheciorum cellulis polyedricis vel paulum elongatis, 10—15 μ diam. compositus. Asci cylindraceo-clavati, 90—100 ⇌ 12—14 μ bitunicati, 8-spori. Sporae clavato fusoideae, plerumque paulum curvatae, hyalinae, 16—19 ⇌ 5—6 μ, inaequaliter bicellulatae. Paraphysoides rarae fibrate.

Hab. in caulibus emortuis *Asphodeli albi* Miller-Helvetia, Kt. Tessin, Monte Generoso, Bella Vista, 22. 5. 1956.

Der Pilz bildet auf den dürren Blättern seiner Wirtspflanze einzelstehende, weit zerstreute, mit den viel zahlreichern Pyknidien der *Phyllostictina*-Nebenfruchtform gemischte, 120—180 μ grosse, kugelige Fruchtkörper. Am Scheitel ist ihnen eine zylinderische, zunächst vollständig geschlossene, sich später mit einem rundlichen Kanal öffnende Mündung aufgesetzt. Die Fruchtkörperwand ist 15—20 μ dick und besteht aus schwach gestreckten, ziemlich derbwandigen, dunkelbraunen, 10—15 μ grossen Zellen, welche aussen mit sehr derben Wänden eine dunkle Kruste bilden. Die zylinderisch-keuligen, 90—100 ⇌ 12—14 μ grossen, dick- und doppelwandigen Asci stehen dicht gedrängt und sind nur von wenigen fädigen Paraphysoiden umgeben. Sie enthalten je acht spindelig-keulige, meist

etwas gekrümmte, hyaline, 16—19 ⇌ 5—6 μ grosse, nahe am untern Ende septierte Ascosporen.

In genau gleich gebauten Gehäusen wird auch die Nebenfruchtform gebildet. Diese ist unter *Phyllostictina Solieri* (Mont.) Petr. et Syd. von Petrak und Sydow (1927) ausführlich beschrieben worden. Daneben findet sich aber auch vereinzelt eine Mikrokonidienform, welche wahrscheinlich mit der von Thümen (1878) beschriebenen *Phoma asphodelina* identisch ist und stäbchenförmige, 4—7 ⇌ 2 μ grosse, einzellige, ungefärbte Sporen besitzt.

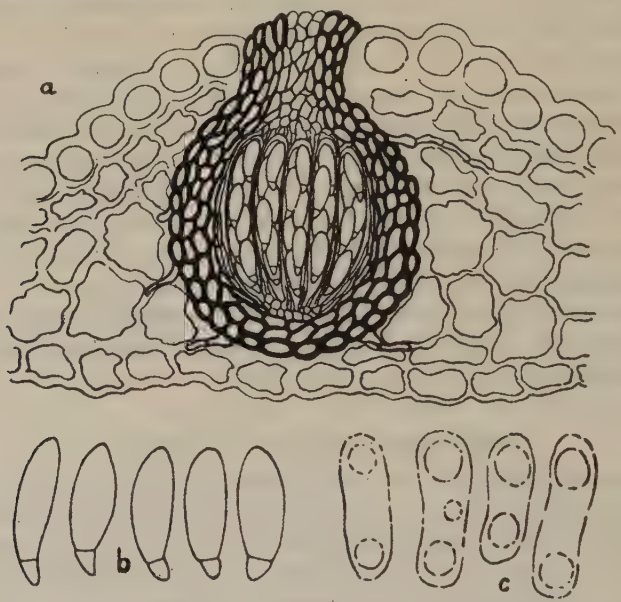

Abbildung 1. 1. a) Schnitt durch einen Fruchtkörper von *Didymella asphodeli*. Vergr. 250 ×. b) Ascosporen. c) Konidien der *Phyllostictina*-Nebenfruchtform. Vergr. je 1000 ×.

Literatur.

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Fungi imperfecti aus Ungarn. — II.

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Diese zweite Mitteilung berichtet über das Vorkommen der erwähnenswerten Fungi imperfecti, welche im Laufe 1957—58 in verschiedenen Gebieten Ungarns, hauptsächlich in der Umgebung von Budapest, gesammelt wurden.

Aus den folgenden 43 Arten stellt das Vorkommen von 12 Arten neue Angaben bezüglich Ungarns dar. Die Namen dieser Arten sind mit * bezeichnet. Während der Aufarbeitung des Materials wurden zwei neue Arten gefunden. Die eine wurde *Phomopsis artemisiae* n. sp., die andere *Phomopsis xanthii* n. sp. genannt. Bei einigen Arten wurden von der Original-Diagnose abweichende Angaben festgestellt.

Die nach den Namen der Arten geschriebenen Buchstaben und arabischen Zahlen dienen als Bezeichnungen der Herbar-Exemplare, während die römischen und arabischen Zahlen die Nummern der Stamm-Kulturen bedeuten.

* *Asteromella galii* Moesz et Lindtner, K. 102. — Auf abgestorbenen Blättern und Stengeln von *Galium schultesii.* — Budapest, Hüvösvölgy.

Phoma acuta Fuck, K. 128. — Auf dürren Stengeln von *Urtica dioica.* — Budapest, Farkasrét.

Phoma herbarum West. K. 126; K. 103; K. 104. — Auf dürren Stengeln von *Urtica dioica.* — Budapest, Farkasrét. Auf dürren Stengeln von *Galium aparine* und *Mycelis muralis.* — Budapest, Hüvösvölgy. — An Exemplaren von Galium ist die Grösse der Konidien von der Original-Diagnose abweichend: 6—7.2 × 2.5—3.2 μ. — Dieser Pilz ist von *Mycelis* noch nicht beschrieben worden. Auf dieser Wirtspflanze sind die Fruchtgehäuse 180—200 mikr. Durchm., die Konidien 5.4—8 × 2.7—3.6 μ gross.

Phoma leonuri Let. K. 117. — Auf dürren Stengeln von *Leonurus cardiaca.* — Bikács. — An unseren Exemplaren ist die Grösse der Konidien von der Original-Diagnose abweichend: 4.5—5.5 × 1.2—1.5 μ.

Phoma nebulosa Mont. K. 105. — Auf dürren Stengeln von *Solanum dulcamara.* Budapest, Hüvösvölgy.

* *Phoma pannonica* Petr. K. 106; K. 124. — Auf dürren Stengeln von *Artemisia vulgaris.* — Magyaróvár und Budapest, Farkasrét. — An *Phoma artemisiaecola* Hollós var. minor Hollós (in Mathematikai

és Természettudományi Közlemények, 1926, 1, p. 1—64. — Fruchtgehäuse 160—230 μ Durchm., Konidien 3—4 × 1 μ) sind die Angaben dieses Pilzes nur wenig abweichend.

* *Phoma sambucella* Sacc. K. 129. — Auf dürren Ästen von *Sambucus nigra.* — Budapest, Testvérhegy. — Unsere Exemplare sind durch folgende Merkmale gekennzeichnet: Fruchtgehäuse 150—190 μ Durchm., mit 14—21 μ weitem Porus. Konidien 6.3—9 × 3.2—4.5 μ. — Es ist sehr wahrscheinlich, dass dieser Pilz, und das sehr nahestehende *Phoma exigua* Desm. „var. *sambuci-nigrae*" (Konidien 6—8 × 3—3.5 μ) mit *Phoma herbarum* West. identisch sind.

Phoma urticae Schulz. et Sacc. K. 107; K. 127. — Auf dürren Stengeln von *Urtica dioica.* — Budapest, Hüvösvölgy und Farkasrét.

Phomopsis arctii (Lasch.) Trav. K. 121; K. 125. — Auf dürren Stengeln von *Arctium lappa.* — Budapest, Kelenföld und Farkasrét.

* **Phomopsis artemisiae** n. sp. K. 106.; K. 123.

Pycnidia sparsa vel seriata, immersa, dein papilla nigra emergentia, depresso-globosa, vel ellipsoidea, usque 250—300 μ diam., ostiolo ca. 80—120 μ, poro 18—25 μ diam., contextu prosenchymatico, dilute brunneo, circa porum obscuriore. Conidia: 1.) ovali-fusoidea, uni- vel biguttulata, 12.5—16 × 2.2—3.6 μ; 2.) filiformia, curvata, 32—40 × 1.3—1.8 μ magna. Conidiophora 20—30 × 1—1.5 μ magna.

Fruchtgehäuse zerstreut oder reihenweise, von der Epidermis bedeckt, nur mit dem schwärzlichen Scheitel sich durchbohrend, niedergedrückt kuglig, oder ellipsoidisch, unten von hellbraunem, oben von schwärzlichbraunem, dicht prosenchymatischem Gewebe, 250—300 μ Durchmesser, mit 80—120 μ hoher Mündung und 18—25 μ weitem Porus. Konidien: 1. schmal spindelförmig, etwas zugespitzt, mit 1-, bald 2(—4) subterminalen Öltröpfchen, 12.5—16 × 2.2—3.6 μ; 2. fadenförmig, S- oder hakenförmig gekrümmt, 32—40 × 1.3—1.8 μ. Konidienträger fadenförmig, dicht stehend, 20—30 × 1—1.5 μ.

Auf dürren Stengeln von *Artemisia vulgaris.* — Magyaróvar und Budapest, Farkasrét.

Diese neue Art kann von den auf *Artemisia* beschriebenen *Phomopsis*-Arten auf Grund der Angaben der Konidien und Konidienträger sowie durch die kräftig entwickelte und dunklere Mündung unterschieden werden:

Phomopsis oblita Sacc. Konidien: 1.) 8—10 × 2—3 μ, 2.) 20—26 × 1 μ; Konidienträger: 10—12 × 1—1.5 μ.

Phomopsis picea (Pers.) Höhn. Konidien: 8—10 × 2.5—3 μ.

Phomopsis abrotani (Oud.) Sacc. Konidien: 7—9 × 2.5 μ; Konidienträger: 20—30 μ.

Erwänht sei noch, dass *Phoma artemisiae* Kalchbr. et Cooke (Konidien 14—18 × 4 μ) auf Grund der Diagnose mit der oben

beschriebenen *Phomopsis artemisiae* n. sp. möglicherweise identisch sei. Die homonyme Art (Konidien 5—8 × 4—4.5 μ), die 1915 von Diedicke publiziert wurde, unterscheidet sich von dem Pilz Kalchbrenner's et Cooke's. Deshalb wird von uns statt des ungiltigen illegitimischen Namens *Phoma artemisiae* Died. (1915) Diedicke's Pilz als **Phoma diedickei** nom. nov. zu bezeichnen sein.

Ob *Phoma artemisiae* Kalchbr. et Cooke ein Synonym für *Phomopsis artemisiae* n. sp. ist, kann der kurzen und mangelhaften Original-Diagnose wegen nicht sicher entschieden werden.

Phomopsis fagopyri Trav. et Spessa. K. 108. — Auf abgestorbenen Ästen von *Fagopyrum baldschuanicum.* — Budapest, Rózsadomb.

* *Phomopsis mali* (Schulz. et. Sacc.) Died. III. 241. — Auf abgestorbener Rinde von *Malus pumila.* — Nyirlövő.

* *Phomopsis ramealis* (Desm.) Died. K. 109. — Auf dürren Ästen von *Evonymus europaea.* — Budapest, Hüvösvölgy.

Phomopsis sambucina (Sacc.) Trav. K. 110. — Auf dürren Ästen von *Sambucus nigra.* — Budapest, Hüvösvölgy.

* **Phomopsis xanthii** n. sp. K. 130.

Pycnidia sparsa, immersa, depresso-ellipsoidea, 300—500 × 200—400 μ magna, 180—250 μ alta, contextu prosenchymatico, brunneo, circa porum non obscuriore. Conidia: 1.) anguste fusoidea, attenuata, hyalina, granulata, vel biguttulata, 7.2—9 × 2.2—2.7 μ, 2.) filiformes, curvata, 18—23.5 × 0.7—0.9 μ magna. Conidiophora attenuata, curvata, 27—45 × 0.2—1 μ magna.

Fruchtgehäuse zerstreut, von der Epidermis bedeckt, nur mit der kurzen Mündung hervorbrechend, niedergedrückt ellipsoidisch, 300—500 × 200—400 μ gross, 180—250 μ hoch, von prosenchymatischem, bräunlichem Gewebe, um den Porus nicht dunkler, mit 20—40 μ dicker Wand. Konidien: 1. schmal spindelförmig, beide Enden spitzlich, 7.2—9 × 2.2—2.7 μ, hyalin, körnig, oder mit zwei gestreckten Öltröpfchen. 2. fadenförmig, verschieden gekrümmt, 18—23.5 × 0.7—0.9 μ; Konidienträger pfriemenförmig, gekrümmt, dicht stehend, 27—45 μ lang, an der Basis ca. 1 μ, am Scheitel ca. 0.2—0.3 μ dick.

Auf dürren Stengeln von *Xanthium strumarium.* — Ujfehértó.

Von dem von der Wirtspflanze *Xanthium* beschriebenen *Phomopsis paui* Gonz. (Konidien: 7—8 × 1—1.5 μ) kann die neue Art durch die Dimensionen der Konidien unterschieden werden.

Cytospora microspora (Corda) Rabenh. K. 121. — Auf dürren Ästen von *Cydonia oblonga.* — Eger. — Dieser Pilz ist von *Cydonia* noch nicht bekannt geworden. Der Bau des Fruchtgehäuses und die Angaben der Konidien sind von der Original-Diagnose nicht abweichend.

Diplodina helianthi Fautr. K. 115. — Auf dürren Stengeln von *Helianthus annuus.* — Ujfehértó.

Diplodina lycopersici Hollós. K. 119. — Auf dürren Stengeln von *Solanum lycopersicum.* — Budapest, Rózsadomb.

Diplodina physalidis Hollós. K. 111. — Auf dürren Stengeln von *Physalis alkekengi.* — Budapest, Hüvösvölgy.

Coniothyrium prunicolum (Sacc.) Husz. K. 133. — Auf Früchten von *Malus pumila.* — Budapest. (Leg.: Frau K. György.)

Diplodia profusa DeNot. K. 112. — Auf abgestorbenen Ästen von *Robinia pseudacacia.* — Eger.

* *Coryneum depressum* Kze. et Schm. K. 118. — Auf dürren Ästen von *Quercus robur.* — Budapest, Farkasrét.

Cylindrocolla urticae (Pers.) Bon. K. 122. — Auf dürren Stengeln von *Urtica dioica.* — Budapest, Farkasrét.

Monilia cinerea Bon. III. 88. — Auf Ästen, Blumen und Früchten von *Prunus cerasus.* — In verschiedenen Gebieten, sehr häufig.

Oedocephalum glomerulosum (Bull.) Sacc. — Auf keimenden Samen von *Allium cepa.* — Makó. Leg.: Ö. Szatala.

Cephalosporium acremonium Corda III. 267. — Auf fäulenden Wurzeln von *Vitis vinifera.* — Budapest.

* *Spicaria violacea* Abbott III. 269. — Von schimmeligen Streptomycin-Lösungen. — Budapest. Leg.: Z. Király.

Scopulariopsis brevicaulis (Sacc.) Bain. III. 251. — Auf eingegangenen Raupen. — Rákoshegy. Leg.: T. Jermy.

Gliocladium roseum (Link.) Bain. III. 47. — Auf Knollen von *Solanum tuberosum.* — Kisvárda.

Botrytis allii Munn. K. 113. — Auf Zwiebeln von *Allium cepa.* — Budapest.

Botrytis cinerea Pers. K. 131. — Auf fäulenden Blättern von *Citrus limonum.* — Budapest, Gewächshaus.

Botrytis tulipae (Lib.) Lind. K. 132. — Auf lebenden Blättern von *Tulipa gesneriana.* — Kecskemét, Miklóstelep.

Beauveria bassiana (Bals.) Vuill. III. 178; III. 233. — Auf eingegangenen *Lytta vesicatoria* und *Bothinoderes punctiventris.* — Akarattya und Budapest. Leg.: G. Reichart.

Gonatobotrys flava Bonorden. — Auf verschiedenen fäulenden Pflanzenteilen. — Budapest.

* *Arthrobotrys superba* Corda. — Auf fäulenden Knollen von *Solanum tuberosum.* — Kisvárda.

Trichothecium roseum (Bull.) Link. III. 244; III. 245. — Auf abgestorbenen Ästen von *Malus pumila.* — Egerbakta. Auf dürren Stengeln von *Chenopodium* sp. — Budapest.

* *Mucrosporium sphaerocephalum* (Berk.) Lind. III. 268. — Auf abgestorbenen Blättern von *Vigna sinensis.* — Kiskundorozsma.

Thielaviopsis basicola (Berk. et Br.) Ferraris. III. 193; III. 247. — Auf Wurzeln von *Nicotiana tabacum.* — Budapest, Gewächshaus. Leg.: J. Szirmai.

Helminthosporium sativum Pam, King et Bakke, III. 195. — Auf Weizenkeimlingen. — Budapest, Gewächshaus. Leg.: Z. Király.

Cercospora radiata Fuck. K. 114. — Auf lebenden Blättern von *Anthyllis vulneraria.* — Zsiroshegy.

Stysanus stemonites (Pers.) Lin. — Auf verschiedenen fäulenden Pflanzenteilen. — Budapest. Auf fäulenden Knollen von *Solanum tuberosum.* — Kisvárda.

Rhizoctonia solani Kühn. III. 17; III. 100. — Auf Knollen von *Solanum tuberosum.* — Budapest. Auf abgestorbenen Keimlingen von *Linum usitatissimum.* — Budapest.

* *Moniliopsis aderholdi* Ruhl. III. 253. — Auf Knollen von *Solanum tuberosum.*

Singeriella n. gen., eine neue, mit den Entopeltaceen verwandte Gattung aus den Hochgebirgen Perus.

Von F. Petrak (Wien).

Singeriella Petr. n. gen.

Stroma tenuiter crustaceum, subcuticulare, epidermidi arte adnatum, ambitu orbiculare vel late ellipsoideum, saepe plus minusve irregulare, contextu pseudoparenchymatico, hyalino vel inferne tantum pallidissime flavidulo; ascomata fere simul cum statu conidiophoro evoluta, ambitu orbicularia vel ellipsoidea, saepe plus minusve irregularia, primo cuticula leniter pustulatim elevata tecta, ea rupta discum nigrescentem nudantia; excipulo nullo; strato basali e stromate sub ascomatibus saepe paulo incrassato constante, pseudoparenchymatico, hyalino; asci subnumerosi, clavati vel cylindraceo-clavati, 8- raro 4—6-spori, fere sessiles vel indistincte stipitati; sporae ellipsoideae vel ovoideae, utrinque latissime rotundatae, $9 \rightleftharpoons 6$ µ, obscure olivaceae, medio zonula tenuissima transversa, praeditae; paraphysoides subnumerosae, fibroso-cellulosae, mox deorsum viescentes et mucosae.

Stroma sehr dünn krustenförmig, subkutikulär der Epidermisaussenwand fest aufgewachsen, im Umriss rundlich oder breit ellipsoidisch, oft mehr oder weniger unregelmässig, von pseudoparenchymatischem, hyalinem oder nur unten sehr hell gelblich gefärbt erscheinendem Gewebe; Askomata sich etwas nach oder fast gleichzeitig mit den Fruchtkörpern der zugehörigen Nebenfruchtform entwickelnd, im Umriss rundlich oder elliptisch, oft etwas unregelmässig, zuerst von der schwach pustelförmig vorgewölbten Kutikula bedeckt, die zur Zeit der Reife ganz unregelmässig aufreisst, so dass die schwärzliche Fruchtschicht entblösst wird. Ein Exzipulum ist nicht vorhanden. Die Basalschicht der Askomata besteht nur aus dem an dieser Stelle oft etwas dickeren, pseudochymatischen, keinerlei Differenzierung in ein Hypothezium und eine Aussenkruste zeigenden Gewebe der Stromakruste, die am Rande kaum oder nur sehr undeutlich emporragt. Aszi zahlreich, keulig oder keulig-zylindrisch, 8-, selten 4—6-sporig, fast sitzend oder sehr undeutlich und ziemlich dick gestielt. Sporen ellipsoidisch oder eiförmig, beidendig sehr breit, oft fast gestutzt abgerundet, ziemlich dunkel olivbraun, $9 \rightleftharpoons 6$ µ, in der Mitte mit einem dünnen, rings herumlaufenden, hyalinen Gürtel, Paraphysoiden senkrecht faserig-zellig, ziemlich spärlich, von oben nach unten verschleimend.

Singeriella peruviana Petr. n. spec.

Maculae epiphyllae, primo irregulariter et laxe, postea saepe plus minusve dense dispersae, ambitu orbiculares vel ellipticae, saepe irregulares, 0.3—3 mm diam., griseo-viridulae, mox griseo-brunneae, postea nigrescentes; stroma maculas plerumque omnino occupans, continuum vel raro plus minusve interruptum, tenuiter crustaceum, subcuticulare, 5—15 μ, sub ascomatibus usque ad 35 μ crassum; contextu pseudoparenchymatico, e cellulis rotundato-angulosis, hyalinis, 2—4.5 μ diam. metientibus nec non paulo protractis, tunc 5—9 μ longis, 3.5—4.5 μ latis composito; ascomata dense dispersa vel aggregata, tunc saepe plus minusve confluentia, paulo post vel saepe simul cum fungo conidiophoro evoluta, ambitu orbicularia vel ellipsoidea, saepe plus minusve irregularia, quoad magnitudinem variabilia, 60—200 μ, raro usque ad 350 μ diam., confluendo etiam majora, primo cuticula lenissime pustulatim elevata tecta, in maturitate ea rupta plerumque usque ad marginem aperta; disco nigrescente; strato basali plano, hyalino vel inferne tantum pallidissime flavidulo, pseudoparenchymatico, contextu cum stromate ipso omnino congruente; asci subnumerosi, clavati vel cylindraceo-clavati, antice late rotundati, postice plus minusve contracti, fere sessiles vel brevissime crassiusculeque stipitati, 8- raro 4—6-spori, p. sp. 30—50 ⇌ 8.5—16 μ; sporae nunc 1- nunc 2- vel indistincte 3-stichae, late ellipsoideae vel ovoideae, utrinque late et saepe truncato-rotundatae, rectae vel inaequilaterae, obscure olivaceae, medio zonula 1—1.5 μ lata transversa praeditae, 7.5—10.5 ⇌ 4.5—7 μ; paraphysoides subnumerosae, fibroso-cellulosae, mox deorsum viescentes et mucosae.

Der Pilz entwickelt sich nur epiphyll und verursacht zuerst einige ganz unregelmässig und locker zerstreute, rundliche oder elliptische, oft mehr oder weniger unregelmässige, 0.3—2 mm, seltener bis ca. 3 mm grosse, graugrüne Flecken, die sich bald graubraun, später schwärzlich färben, ziemlich scharf begrenzt sind und später oft noch viel zahlreicher erscheinen. In diesen Flecken entwickelt sich subkutikulär ein über die ganze Fläche derselben ausgebreitetes, seltener durch grössere oder kleinere Zwischenräume unterbrochenes Stroma. Dasselbe bildet eine, an den steril bleibenden Stellen meist 5—15 μ, unter den Fruchtkörpern 10—35 μ dicke, pseudoparenchymatische Kruste, die aus unregelmässig rundlich eckigen, relativ dickwandigen, hyalinen, 2—3.5 μ, seltener bis ca. 4.5 μ Durchmesser erreichenden, besonders unten zuweilen auch etwas gestreckten, ellipsoidischen, 5—8 μ, vereinzelt bis 9 μ langen, 3.5—4.5 μ breiten Zellen besteht. Die Zellen der Epidermis werden durch hell rostgelb gefärbte, sehr undeutlich kleinzellige (?) Komplexe ausgefüllt. Die unmittelbar an die Epidermis angrenzenden, lang gestreckten Zellen des Palisadenparenchyms sind oben auch rostgelb verfärbt. Askomata meist dicht

beisammenstehend und oft mehr oder weniger zusammenfliessend, sich oft gleichzeitig oder etwas nach der zugehörigen Nebenfruchtform entwickelnd, im Umriss rundlich oder breit elliptisch, oft etwas unregelmässig, sehr verschieden, meist ca. 60—200 μ, vereinzelt bis ca. 350 μ gross, durch Zusammenfliessen zuweilen auch noch etwas grösser und ganz unregelmässig werdend, zuerst von der schwach konvex vorgewölbten Kutikula bedeckt, die bald unregelmässig aufreisst, so dass die schwärzliche Fruchtschicht meist bis zum Rande entblösst und von den meist senkrecht emporgerichteten Lappen der zersprengten Kutikula umgeben wird. Ein besonderes Exzipulum wird nicht gebildet. Die Basis der Fruchtkörper besteht nur aus der hier meist etwas dickeren, jedoch keine Differenzierung in Hypothezium und Aussenkruste zeigenden, hyalinen Stromakruste. Aszi ziemlich zahlreich, parallel stehend, keulig oder zylindrisch keulig, oben breit abgerundet, unten mehr oder weniger zusammengezogen, fast sitzend oder nur sehr kurz und dick gestielt, ziemlich derb-, aber nicht besonders dickwandig, 8-, seltener 4—6-sporig, p. sp. 30—43 μ, seltener bis ca. 50 μ lang, 8.5—16 μ breit. Sporen bald ein-, bald zwei- oder undeutlich dreireihig, kurz ellipsoidisch oder breit eiförmig, beidendig sehr breit, oft fast gestutzt abgerundet, im optischen Querschnitt dann oft eine sehr stumpf rechteckige Form zeigend, gerade, selten etwas ungleichseitig, ziemlich dunkel olivbraun, in der Mitte mit einem hyalinen, scharf begrenzten, 1—1.5 μ breiten Gürtel versehen, 7.5—10.5 μ lang, 4.5—7 μ breit. Paraphysoiden ziemlich spärlich, aus gestreckten, ca. 5—10 μ langen, 2—3 μ breiten, mehr oder weniger deutliche, senkrechte Reihen bildenden Zellen bestehend, bald von oben nach unten verschrumpfend und verschleimend.

Auf lebenden und absterbenden Blättern von *Polylepis incana* mit der zugehörigen Nebenfruchtform *Chrysogloeum peruvianum* Petr. n. gen. et spec. Peru; Dpto. Cuzco: Cochahuasi, 3500 m, 21. V. 1958, leg. R. Singer.

Chrysogloeum Petr. n. gen.

Stroma ut in fungo ascophoro; acervuli paulo ante ascomata fungi ascophori vel fere simul cum iisdem evoluti, primo cuticula tantum lenissime pustulatim elevata vel etiam strato pseudoparenchymatico, pellucide olivaceo cuticulae arte adnato tecti, iis ruptis plus minusve, saepe usque ad marginem denudati; conidia ellipsoidea vel breviter cylindracea, raro oblongo-ovoidea, utrinque late rotundata, recta, raro inaequilatera vel lenissime curvula, continua, 15 ⇌ 8 μ, plasmate homogeneo, pallide et amoene aureo farctae; conidiophora superficiem strati basalis dense obtegentia, subulato-bacillaria, simplicia, mox viescentia et mucosa.

Stroma wie bei der zugehörigen Schlauchform. Fruchtkörper meist etwas früher als die Askomata der Schlauchform, nicht selten

aber auch fast gleichzeitig mit ihnen erscheinend, im Umriss rundlich oder breit elliptisch, oft mehr oder weniger unregelmässig, mit ganz flacher, pseudoparenchymatischer, der Stromakruste angehörender, hyaliner, nur unten oft sehr hell gelblich gefärbter Basalschicht, die kleineren oben nur von der sehr schwach pustelförmig aufgetriebenen Kutikula, die grösseren zuweilen auch von einer ein- oder unvollständig zweischichtigen, pseudoparenchymatischen, durchscheinend olivbraunen, oft auch mehr oder weniger unvollständigen, mit der Kutikula verwachsenen und mit ihr aufreissenden Deckschicht bedeckt. Konidien ellipsoidisch oder kurz zylindrisch, selten länglich eiförmig, beidendig breit abgerundet, selten ungleichseitig oder schwach gekrümmt, einzellig, 15 ⇌ 8 μ, mit homogenem, schön und hell goldgelb gefärbtem Plasma. Konidienträger die Basalschicht sehr dicht überziehend, pfriemlich stäbchenförmig, einfach, ziemlich kurz, bald verschleimend.

Chrysogloeum peruvianum Petr. n. spec.

Maculae et stroma ut in fungo ascophoro; acervuli paulo ante vel fere simul cum ascomatibus evoluti, plus minusve dense dispersi, ambitu orbiculares vel late ellipsoidei, saepe plus minusve irregulares, minores cuticula leniter pustulatim elevata tecti, majores interdum strato pseudoparenchymatico, pellucide olivaceo, e cellulis rotundato-angulosis, 3—8 μ diam. metientibus composito, cuticulae arte adnato, in maturitate cum ea irregulariter disrumpente praediti, 50—350 μ diam.; strato basali plano, hyalino vel inferne tantum pallidissime flavidulo, pseudoparenchymatico, contextu cum stromate ipso omnino congruente; conidia ellipsoidea vel breviter crasseque cylindracea, raro oblongo-ovoidea, utrinque late rotundata nec attenuata, recta, raro inaequilatera, continua, plasmate homogeneo amoene et pallide aureo farctae, episporio ca. 0.3 μ crasso praeditae, 10—21 ⇌ 6—10 μ; conidiophora subulato-filiformia, totam strati basalis superficiem obtegentia, simplicia, apicem versus attenuata, 6—15 ⇌ 1.5—2 μ mox virescentia et mucosa.

Fleckenbildung und Bau des Stromas wie bei der zugehörigen Schlauchform. Fruchtkörper etwas früher oder fast gleichzeitig mit den Askomata erscheinend, dicht oder locker zerstreut, oft mehr oder weniger dicht beisammenstehend, im Umriss rundlich oder breit elliptisch, oft unregelmässig, die kleineren meist nur von der schwach pustelförmig vorgewölbten Kutikula, die grösseren zuweilen von einer ein- oder unvollständig zweizellschichtigen, pseudoparenchymatischen, aus rundlich eckigen, ziemlich dickwandigen, durchscheinend olivbraunen, 3—5 μ, selten bis ca. 8 μ grossen Zellen bestehenden, mit der Kutikula fest verwachsenen, mit dieser durch einige mehr oder weniger senkrecht emporgerichtete Lappen unregelmässig aufreissenden Deckschicht versehen, zuletzt meist bis zum Rande offen, mit

ganz flacher, hyaliner, nur unten oft sehr hell gelblich gefärbter, der gemeinsamen Stromakruste angehörender, genau so wie diese gebauter Basalschicht, 50—180 μ, selten bis ca. 350 μ Durchmesser erreichend, durch Zusammenfliessen zuweilen auch noch etwas grösser werdend. Konidien länglich ellipsoidisch oder kurz und dick zylindrisch, seltener eiförmig, beidendig breit abgerundet, nicht verjüngt, gerade, selten ungleichseitig, einzellig, mit homogenem, schön und hell goldgelb gefärbtem Plasma und deutlich sichtbarem, ca. 0.3 μ dickem Epispor, 10—21 ⇌ 6—10 μ, unten mit einer sehr kleinen, aber meist deutlich erkennbaren, papillenförmigen Ansatzstelle des Trägers versehen. Konidienträger pfriemlich stäbchenförmig, einfach, aus ca. 1.5—2 μ dicker Basis nach oben allmählich verjüngt und sehr dünnfädig werdend, die ganze Oberfläche der Basalschicht sehr dicht überziehend, 6—10 μ, selten bis ca. 15 μ lang, bald ganz verschleimend.

Diesen durch seinen eigenartigen Bau sehr ausgezeichneten Pilz habe ich seinem Entdecker, dem bekannten Hymenomyzetenforscher, Herrn Dr. Rolf Singer, zu Ehren benannt. Das mir vorliegende Material ist sehr zahlreich und ermöglichte ein gründliches Studium verschiedener Entwicklungszustände. Trotzdem konnte die systematische Stellung des prächtig entwickelten, wohl sehr isoliert stehenden, hochinteressanten Pilzes nicht sicher festgestellt werden. Die ziemlich dunkel olivbraunen, breit eiförmigen oder ellipsoidischen, beidendig breit, oft mehr oder weniger gestutzt abgerundeten Sporen sind mit einem scharf begrenzten, schmalen, in der Mitte befindlichen, hyalinen Gürtel versehen und stimmen in jeder Hinsicht mit *Entopeltis interrupta* (Wint.) v. Höhn. überein. Durch den ganz abweichenden Bau des Stromas und der Askomata ist aber unser Pilz vom *Entopeltis*-Typus ganz verschieden, wie mir ein Vergleich mit der oben genannten Art zeigte, die von Höhnel in Sitzb. Akad. Wiss. Wien, Math. nat. Kl. CXIX. p. 418 (1910) sehr ausführlich beschrieben wurde. Bei *Entopeltis* ist nur ein braunviolettes, subkutikuläres, netzförmig verzweigtes Myzel, nicht aber eine mehr oder weniger zusammenhängende, hyaline, pseudoparenchymatische Stromakruste vorhanden. Die Basis der Fruchtkörper von *Entopeltis* besteht nur aus einer hyalinen, sehr dünnen Schicht, die v. Höhnel l. c. als „sehr dünnen Fruchtboden" bezeichnet hat. Von den wenig zahlreichen Aszi sind die weiter aussen befindlichen stark, oft fast horizontal gegen die Mitte des Fruchtgehäuses geneigt. Die gut entwickelte Deckschicht der *Entopeltis*-Gehäuse ist einzellschichtig und besteht aus vier- bis sechseckigen, violettbraunen Zellen. In ihrer Mitte ist ein rundliches, oft etwas eingerissenes, bis ca. 25 μ grosses, ganz flaches, untypisches Ostiolum vorhanden.

Obwohl *Singeriella* durch das gut entwickelte, eine mehr oder weniger zusammenhängende, subkutikuläre, dünne, kleinzellige, hyaline Kruste bildende Stroma und durch die dem Stroma gleichsam

aufgewachsenen, ganz verschieden gebauten Fruchtkörper weit verschieden ist, wird man diese Gattung mit Rücksicht auf die völlig übereinstimmend gebauten Sporen vorläufig in die Nähe von *Entopeltis* stellen oder ihr einen ganz isolierten Platz in einer besonderen Familie anweisen müssen. *Singeriella* ist auf jeden Fall eine sehr ausgezeichnete, sich den Diskomyzeten stark nähernde, auch durch die eigenartige Nebenfruchtform trefflich charakterisierte Gattung.

Ordinamento artificiale delle specie del genere Coniothyrium Corda.

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Il genere *Coniothyrium*, stabilito da Corda nel 1840, in un secolo è stato smisuratamente accresciuto di specie o combinazioni proposte, che oggi ammontano a circa 477 (inclusi i sinonimi).

Detto genere è stato oggetto di varie più o meno complete revisioni tra le quali sono da mettere in prima linea quelle di Petrak e Sydow (1927) e di Wollenweber ed Hochapfel (1937). Nessuno di questi studiosi è stato però in condizioni di affrontare una revisione così ampia da considerarsi come monografia del genere, per le stesse difficoltà che si sono a noi presentate: le difficoltà di procurarsi i tipi delle specie proposte e la frammentarietà o incompletezza del materiale di studio. Ciononostante gli studiosi che ci hanno preceduto in questo lavoro (e segnatamente Petrak e Sydow) attraverso un eccellente lavoro di microtecnica e di speciologia hanno potuto delineare il genere *Coniothyrium*, quale oggi viene generalmente inteso dai micologi, e, nello stesso tempo, illuminare le difficoltà nel discriminarlo da generi vicini.

La storia del genere *Coniothyrium* è stata ampiamente tracciata da Petrak e Sydow e, per quanto ad essa concerne, rimandiamo allo studio di questi due Autori. Basterà osservare che abbiamo accettato, in linea generale, la descrizione che ne danno i suddetti Autori, tenendo conto dell'emendamento di Saccardo. Minore uso abbiamo potuto fare del lavoro di Wollenweber e Hochapfel, anche perchè limitato a troppo poche specie.

La nostra base di partenza è stata altresì lo studio sperimentale morfo-culturale e biologico del *Coniothyrium concentricum* (Desm.) Sacc. di cui ad una nostra precedente publicazione (Bestagno Biga, Riv. Ortoflorofrutt. Ital., **41**, 53. 1957).

Come giustamente asseriscono Petrak e Sydow le caratteristiche delle specie passano insensibilmente da una specie all'altra e — ciò che è più grave ancora — sfuggono egualmente dal genere *Coniothyrium* ad una serie di generi vicini. Le stesse basi della suddivisione proposta da Petrak e Sydow a seconda delle dimensioni e della forma delle picnidiospore, alle nostre osservazioni sperimentali sono parse incerte, ciò che, del resto, è stato pure osservato dai sullodati Autori e rimane confermato dai valori variabili delle dimensioni

e della variabilità delle forme assegnati da più Autori alle picnidiospore di una stessa specie.

A questo punto due erano le vie possibili da seguire: — o seguire una tendenza abbastanza ben delineatasi in questi ultimi anni, raggruppando le specie in pochissime entità ben definite e ponendo, di conseguenza, ad esse decine, se non centinaia di sinonimi (come ha fatto, ad es., Von Arx per il genere *Gloeosporium*), — oppure adottare una classificazione artificiale sulla base dei gruppi di piante ospiti (Famiglie) e limitare la sinonimizzazione alle specie conglobate secondo le Famiglie delle piante ospiti.

Il primo criterio probabilmente porta ad una sistematica naturale, per quanto è possibile in un ordine di funghi imperfetti picnidici, ma fa astrazione in maniera completa da una cartteristica che entra nei criteri classificatori allorchè trattasi di funghi dotati anche di attitudini patogene e facoltà parassitarie: la specializzazione rispetto agli ospiti.

Se il fine delle classificazioni è anche quello dell'utilità dal punto di vista fitopatologico, questa aggregazione in pochissime specie che ignorano l'ospite sul quale vivono non ha nessuna utilità. Pensiamo dunque che una classificazione più „comoda" debba tener conto delle piante ospiti, raggruppate però in Famiglie e talvolta in un insieme di Famiglie. A ciò autorizzava — sia pure con le limitazioni inerenti alla sperimentazione su un solo *Coniothyrium* — il lavoro precedentemente citato il quale ci aveva dimostrato che il *C. concentricum* (Desm.) Sacc. è atto a vivere su Liliacee (Agavacee incluse) e non su altre famiglie di piante ospiti con eccezione di alcune matrici ad abito similare come alcune Euforbie succulente. Anche questo criterio di una distribuzione morfologica delle specie in seno a Famiglie o gruppi di Famiglie di piante ospiti non è dunque assoluto. Probabilmente sarà anche da tenere in conto il fatto che in una stessa specie possono esistere ceppi o linee a virulenza più esaltata a quindi presumibilmente a specializzazione matricale più spinta e ceppi ad attitudini semiparassitarie e quindi ad aspetto biologico di azione più vasta.

Per queste ragioni abbiamo francamente dichiarato che i raggruppamenti e le chiavi analitiche da noi proposte erano artificiali aggiungendo che l'utilità potrà essere maggiore per i fitopatologi che per i micologi.

In seno ai gruppi specializzati di *Coniothyrium* i criteri discriminativi delle specie sono stati i seguenti:

1. non considerare tutte le specie con stromi endotissurali nei riguardi dela pianta ospite, riferibili a generi che nulla hanno a che vedere con *Coniothyrium*;

2. nelle specie con stroma soltanto o prevalentemente superficiale non considerare come *Coniothyrium* le specie decisamente stromatiche

(che vertono pure ad altri generi, prevalentemente ad *Haplosporella*); tenendo presente però che anche i *Coniothyrium* possono avere un ridotto o modesto stroma, accettare quindi come tali quelle specie nelle quali le altre caratteristiche rientrassero in quelle di *Coniothyrium;*

3. ammettere specie nelle quali le pareti dei picnidi siano relativamente sottili e a cellule relativamente grosse. Questa caratteristiche è connessa con l'assenza di stroma il quale comporta, oltrechè un maggiore spessore delle pareti dei corpi fruttiferi, delle cellule più piccole e più densamente stipate. Si tenga presente quanto è stato scritto in precedenza circa un modesto abbozzo di evoluzione delle pareti verso un ispessimento stromatico;

4. scartare le specie con conidiofori discrettamente sviluppati e superiori ai 6—10 micron di lunghezza e mantenere le specie a conidiofori più corti sino a papillari. Anche per questa caratteristica è innegabile una certa variabilità, ma sta di fatto che le specie fungine a conidiofori lunghi oltre i limiti segnati hanno di regola delle caratteristiche morfologiche che divergono da *Coniothyrium.* Un caso critico ci si è presentato nelle diagnosi in cui veniva taciuta la presenza o l'assenza di conidiofori, ciò che è usuale nelle specie meno recentemente (o meno accuratamente) descritte. In tal caso si è tenuto conto della convergenza delle altre caratteristiche per l'attribuzione o meno della specie al genere *Coniothyrium*;

5. accettare soltanto le specie con picnoconidi bruni, eliminando quelle a picnoconidi decisamente jalini, pur tenendo presente una certa variabilità nell'intensità del colore in rapporto alla diversa maturità;

6. non considerare un criterio valido quello della forma dei conidi — che è in fondo un rapporto fra le due dimensioni ortogonali — per la variabilità di essa in seno ad una medesima specie e molte volte da porsi in relazione ad un diverso stadio di maturità dei picnoconidi o ad un diverso substrato sul quale si sviluppi il fungo, che determina il prevalere di una delle forme. Benchè la maggior parte dei picnoconidi sia di forma ovata od ellissoidale, la forma può tuttavia variare da sferoidea ad allungata e cilindrica. In qualche caso però i picnoconidi sono nella quasi totalità di una delle due forme estreme e più particolarmente di quella sferoidea. In questo caso si sono tenute distinte le specie a picnidiospore globose e non globose;

7. accettare le specie con picnoconidi continui, non superiori di norma ai 10 micron (oltre tale limite le specie vertono ad altri generi e principalmente *Ascochytella* e *Microdiplodia*) pur tenendo in considerazione la polimetria e la variabilità delle dimensioni dei picnoconidi, alcuni dei quali possono superare i valori medi degli altri. Non di rado questi stessi conidi maggiori sono anche provvisti di un setto trasversale, ciò che potrebbe far supporre (come affermano

anche Wollenweber e Hochapfel) che si tratti di elementi in stadio germinativo.

Ogni altra caratteristica morfologica non ci è parsa possedere un peso o una costanza sufficienti da doversi considerare in una classificazione di *Coniothyrium*; particolarmente forma e dimensioni dei picnidi sono così variabili da non costituire un solido carattere specifico. Anche in merito all'ostiolatura nel nostro lavoro precedente avemmo modo di notare come spesso nelle singole diagnosi non venisse riportata la natura dell'ostiolo che normalmente si forma a maturità del picnidio per lisi o lacerazione.

Molto del nostro lavoro, per le difficoltà poc'anzi indicate, si è svolto sulla base delle descrizioni delle singole specie, tenendo naturalmente conto delle successive descrizioni od osservazioni, od emendamenti, attraverso un'indagine bibliografica così vasta come è stato nostro potere effettuare. Allorche possibile lo studio degli esemplari è stato confrontato con le diagnosi o le descrizioni.

Per poche specie (4) non siamo riusciti a prendere conoscenza delle descrizioni e ciò è stato segnalato in ciascuna delle corrispondenti Famiglie delle piante ospiti.

Le chiavi analitiche sono disposte secondo l'ordine delle Famiglie delle piante ospiti seguendo le moderne trattazioni e particolarmente quella di Wettstein, evitando però le più recenti che, nei nostri riguardi, avrebbero portato ad un eccessivo spezzettamento delle Famiglie. Ciononostante si è tenuto conto di qualcuna delle meglio consolidate acquisizioni in merito.

Per ognuna delle Famiglie di piante ospiti le eventuali specie di *Coniothyrium* ivi incluse sono state considerate sulla base della o delle caratteristiche discriminative. Naturalmente il binomio accettato è quello basato sul più vecchio nome specifico validamente pubblicato, a norma delle regole internazionali di nomenclatura botanica. Un caso critico ci è stato offerto dalla serie di varietà di alcune specie collettive (principalmente *C. olivaceum* Bon. e *C. fuckelii* Sacc.), varietà pubblicate da Saccardo in "Michelia" e nella "Sylloge". Gli Autori che ci hanno preceduto in queste ricerche, con qualche eccezione, le hanno considerate come forme matricali e in conseguenza "nomina nuda". Se veramente tali (come ad es. si ha in numerose "formae speciales") naturalmente ci siamo attenuti anche noi ad un eguale criterio. Non così qualora era ammessa una, sia pur breve, frase diagnostica anche ridotta a segnalazioni delle dimensioni delle picnospore. Poichè tali succinte descrizioni rappresentano una diagnosi che spesse volte non differisce troppo da quella data per specie più antiche, abbiamo considerato il nome della varietà o forma come validamente pubblicato, effettuando, se nel caso, le combinazioni relative per ragioni di priorità.

La sinonimia è stata tanto completa quanto possibile, includendovi la piena citazione delle serie di pubblicazione dei binomi, per comodità degli studiosi. Con il segno di eguaglianza a due linee orizzontali (=) abbiamo indicato le specie o le combinazioni da noi poste nella sinonimia; con il segno di eguaglianza a tre linee orizzontali (≡) la sinonimia proposta da altri Studiosi.

Benchè questo lavoro di revisione ci sia costato un tempo ed uno sforzo notevoli, abbiamo coscienza della provvisorietà e della approssimazione della classificazione da noi proposta. Sotto le nostre condizioni di lavoro non era possibile fare di più e di meglio, ma ci auguriamo che qualche studioso voglia riprendere il problema sistematico dei *Coniothyrium* partendo da basi sperimentali più ampie attraverso una indagine morfobiologica sulla specializzazione e la variabilità di essi.

In Fungis.

A. Pycnidiosporis 3,5—6(8) × 2,5—4(5) μ:

C. epimyces Sacc. et Speg., Mich. **1**, 203. 1878; Sacc., Syll. **3**, 319. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 513. 1927; in cute *Polypori squamosi* putri in Ital. bor.

In hac specie sequentes includendae videntur:

C. botryosphaerioides Sacc. et Briard apud Sacc., Syll. **3**, 312. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 394. 1927; in stromatibus *Gibberellae* sp. ad ramos siccos *Populi* in Gallia.

C. crepinianum Sacc. et Roum., Rev., Myc. **6**, 32. 1884; Sacc., Syll. **3**, 315. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 377. 1927; in fungillis ignotis ad caulem putrem *Brassicae* in Gallia (in Sacc. et Roum. l. c. indicatum in caule putri *Brassicae*) nec non in peritheciis *Leptosphaeriae dolioli* (Pers.) Ces. et De Not. et in pycnidiis *Plenodomi* sp. p. ad caules *Urticae dioicae* in Moravia ≡ *C. vile* Karst. et Har., Rev. Myc. **12**, 130. 1890; Sacc., Syll. **10**, 262. 1892 (in diagnosi indicatum ad caules aridos *Solidaginis glabrae* in Gallia) ≡ *C. heteropatellae* v. Höhn., Ann. Myc. **1**, 399. 1903; Sacc., Syll. **18**, 304. 1906; in caulibus siccis *Chaerophylli* (Umbelliferae), parasiticum in *Heteropatella lacera* in Tirolia (vide etiam v. Höhn., Ann. Myc. **3**, 552. 1905; Wehmeyer, Sydowia **6**, 416. 1952) ≡ *Cryptophaeella heteropatellae* v. Höhn., Ann. Myc. **1**, 399. 1903.

C. fraxini (Died.) Pet. et Syd. in Fedde Rep. Beih. **42**, 367. 1927; in loculis stromatum et in stromate *Botryodiplodiae fraxini* ad ramos siccos *Fraxini excelsioris* in Germania ≡ *Haplosporella fraxini* Died., Kryptfl. Mark Brandenburg **9**, 588. 1914.

C. glabroides Stevens, Bot. Gaz. **65**, 234. 1918; Sacc., Syll. **25**, 236. 1931; parasiticum in *Meliolis plurimis* (typus in *M. glabroides*) (vide etiam Pet. et Syd. in Fedde, Rep. Beih. **42**, 318. 1927).

C. massariae Pet., Ann. Myc. **38**, 374. 1940; in peritheciis *Massariae conspurcatae* (Wallr.) Sacc. ad ramos emortuos *Pruni padi* in Austria.

C. minitans Campbell, Mycologia **39**, 191. 1947; sclerotia *Sclerotiniae sclerotiorum* in California parasitans.

AA. Pycnidiosporis 7—9(11) × 3—4 μ:

C. insuetum Syd., Ann. Myc. **23**, 414. 1925; Pet. et Syd. in Fedde, Rep. Beih. **42**, 382. 1927; parasiticum in stromate *Nectriae prodigiosae* Syd. ad folias *Serjanae caracasanae* in Costa Rica.

Observationes:

Propter conidiophororum et conidiorum magnitudinem species sequentes dubias reputamus:

— *C. phyllachorae* Maubl., Bull. Soc. Myc. France **20**, 72. 1904; Sacc., Syll. **18**, 308. 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 389. 1927; in stromatibus *Phyllachorae maydis* Maubl. in foliis *Zeae maydis* in Mexico; secundum Urries, Sydowia ser. 2, Beih. **1**, 283. 1957 ≡ *C. occultum* Syd., Sydowia **35**, 281. 1937 (vide etiam Syd., Sydowia **37**, 196. 1939; *C. occultum* et *C. phyllachorae* Maubl. an idem cum *Cryptodidymosphaeria clandestina* Syd. ?).

— *C. tungurahuense* Pet., Sydowia **2**, 367. 1948; in stromate *Phyllachorae piptocarphae* et *Piptocarphae* sp. in Equador.

Secundum Pet. et. Syd. in Fedde, Rep. Beih. **42**, 431. 1927, *C. tuberculariae* Pass., Rendic. R. Accad. Lincei Roma **7**, 48. 1891; Sacc., Syll. **10**, 268. 1892 est species dubia.

C. parasitans (Berk. et Rav.) Tassi, Bull. Lab. Orto Bot. Siena **5**, 23. 1902 ≡ *Sphaeropsis parasitans* Berk. et Rav., Grevillea **2**, 180. 1874 in *Hypoxylo* in Amer. bor. secundum Pet. et Syd., (l. c. pag. 427) est species delenda.

C. hookeri Speg., Bol. Acad. Nac. Cienc. Cordoba **11**, 290. 1888; Sacc., Syll. **10**, 268. 1892; in disco *Cyttariae hookeri* ? e ramulis fagineis vix erumpente in Fuegia, sec. Pet. et Syd. (l. c. pag. 423) ≡ *C. cyttariae* Bomm. et Roum., Bull. Acad. Roy. de Belg., Cl. Scienc. pag. 644. 1900, est probabiliter *Ophiostomella* aut *Melanospora* (v. etiam Ann. Myc. **23**, 246. 1925).

C. salaciae Allesch., Hedw. **36**, 241. 1897; Sacc., Syll. **14**, 923. 1899; ad *Asterinam salaciae* Allesch. in foliis *Salaciae* sp. (Hippocrateaceae) in Brasilia, sec. Pet. et Syd., l. c., pag. 429, est species excludenda.

Pycnidiosporis 2—5 × 2—4 μ:

C. epiphyllum Lindsay (non Cooke v. in Fagaceis), Sperm. Fil. pag. 277. 1861 ?; Vouaux, Bull. Soc. Myc. France **30**, 296. 1914; Sacc., Syll. **25**, 239. 1931; in *Collemati (?) epiphyllo* in Europa.

Species includenda:

C. imbricariae Allesch., Ber. Bayer. Bot. Ges. **5**, 18. 1897; Sacc., Syll. **14**, 925. 1899; Vouaux, Bull. Soc. Myc. France **30**, 291. 1914; in apotheciis *Parmeliae* (= *Imbricariae*) *exasperatae* (= *aspidatae*) nec non *P. prolixae* et in thallo *P. sulcatae, Lethariae arenariae, Physciae venustae* in Germania.

Observationes:

Dubiae vel excludendae sunt species sequentes:

— *C. harmandi* Zopf in Harmand., Lich. Port. in Bull. Soc. Bot. France, pag. 74. 1906; Vouaux, Bull. Soc. Myc. France **30**, 295. 1914; Sacc., Syll. **25**, 240. 1931; in thallo *Pertusariae malaleucae* in Lusitania, propter sterigmata bifurcata.

— *C. lichenicola* Karst. var. *buelliae* von Keissler, Centralbl. f. Bakter. **27**, Abt. 2, 209. 1910; Sacc., Syll. **22**, 937. 1913; Vouaux, Bull. Soc. Myc. France **30**, 292. 1914; in thallo *Buelliae disciformis* in Austria, propter conidiophororum (non sporarum ut in Sacc.) longitudinem.

— *C. cargillianum* (Linds.) Sacc. et Trott., Syll. **22**, 977. 1913; in apotheciis *Parmeliae perforatae* in Nova Zelandia, propter "sporulis ?" in descriptione.

— *C. usneae* (Anzi) Vouaux, Bull. Soc. Myc. France **30**, 295. 1914; Sacc., Syll. **25**, 240. 1931; in apotheciis *Usneae barbatae* in Italia bor. et Tirolia, propter conidiophororum longitudinem.

— *C. ramalinae* Vouaux, Bull. Soc. Myc. France **30**, 296. 1914; Sacc., Syll. **25**, 240. 1931; in *Ramalina yemensi* in Mexico, propter sporulas verrucosas.

Species ad genus *Lichenoconium* transferendae:

— *C. lichenicolum* Karst., Meddel. Soc. pro Fauna et Flora Fennica **14**, 104. 1887; Sacc., Syll. **10**, 268. 1892; Vouaux, Bull. Soc. Myc. France **30**, 291. 1914; in apotheciis *Parmeliarum* in Fennia, fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 432. 1927, syn. *Lichenoconii lichenicoli* (Karst.) Pet. et Syd.

— *C. cladoniae* (Ell. et Ev.) Sacc., Syll. **10**, 268. 1892; Vouaux, Bull. Soc. Myc. France **30**, 293. 1914; in apotheciis *Cladoniae cariosae* in Am. bor., fide Pet. et Syd., l. c. pag. 433, syn. *Lichenoconii cladoniae* (Ell. et Ev.) Pet. et Syd.

— *C. pyxidatae* Oud., Proced. Kon. Akad. Wetensch. Amsterdam pag. 242. 1900; Sacc., Syll. **16**, 912. 1902; Vouaux, Bull. Soc. Myc.

France **30**, 293. 1914; in *Cladonia pyxidata* in Hollandia nec non in thallo *Parmeliae sulcatae, Lethariae arenariae, Physciae venustae* et in podetiis *Cladoniae fuscatae*, fide Pet. et Syd., l. c. pag. 435, syn. *Lichenoconii pyxidatae* (Oud.) Pet. et Syd.

— *C. japii* Died., Kryptofl. Mark Brandenburg **9**, 573. 1914; Sacc., Syll. **25**, 240. 1931; in disco apotheciorum *Parmeliae conspersae* in Germania, fide Pet. et Syd., l. c. pag. 435, syn. *Lichenoconii japii* (Died.) Pet. et Syd.

— *C. lecanoracearum* Vouaux, Bull. Soc. Myc. France **30**, 293. 1914; Sacc., Syll. **25**, 240. 1931; in apotheciis *Lecanorae rugosae* et *Buelliae rubellae, Lecanorae subfuscae, L. intumescentis, L. nitentis, Squamariae concoloris* var. *augustae, Lecanorae symmincterae* et *L. pacificae* in Gallia, Belgio, Italia bor. et Am. bor., fide Pet. et Syd., l. c. pag. 434, syn. *Lichenoconii lecanoracearum* (Vouaux Pet. et Syd.

In Muscis.

Pycnidiosporis 8—10 μ diam.:

C. muscicolum Ell., Descr. New spec. Fung. in Journ. Myc. pag. 276. 1893; Sacc., Syll. **11**, 515. 1895; in capsulis *Polytrichii* in Am. bor.

In Lycopodiaceis.

Pycnidiosporis 6 × 2 μ:

C. lycopodinum Sacc. et Paol. apud Sacc., Bull. Soc. Bot. Belg. **28**, parte 1, pag. 97. 1899; Syll. **10**, 267. 1892; in foliis *Lycopodii annotini* in Sibiria.

In Equisetaceis.

Pycnidiosporis 6—8 × 3—4 μ (v. Pet. et Syd.):

C. equiseti Lamb. et Fautr., Rev. Myc. **18**, 142. 1896; Sacc., Syll. **14**, 924. 1899; Pet. et Syd. in Fedde, Rep. Beih. **42**, 365. 1927; in caulibus *Equiseti telmantejae* in Gallia nec non in ramis *Equiseti limosi* in Austria.

In Polypodiaceis.

A. Pycnidiosporis 4 × 2,5 μ:

C. polypodii Ferraris, Malpighia **18**, 494. 1904; Sacc., Syll. **18**, 308. 1906; in pag. sup. frondis *Polypodii dryopteris* in Italia bor.

AA. Pycnidiosporis 2,5 × 1,5—2 μ:

C. pteridis A. L. Smith, Trans. Br. Myc. Soc. **5**, 244. 1916; Sacc., Syll. **25**, 236. 1931; in rachide pinnulisque *Pteridis aquilinae* in Britannia.

In Cycadaceis.

Adsunt in Cycadaceis pro parte:

C. olivaceum Bon. (Vide in Araliaceis); in *Cycade.*

C. batumense Siem. (v. in Palmis); in foliis *Cycadis revolutae.*

In Gnetaceis.

Pycnidiosporis 3—4 × 1 μ:

C. ephedrinum Grove, Bull. Misc. Inf. R. Bot. Gard. Kew No. 4, pag. 190, 1919; Sacc., Syll. **25**, 237. 1931; in ramulis *Ephedrae andinae* in Britannia.

In Pinaceis.

A. Sine stromate, Pycnidiosporis 4—8(10) × (2)2,5—6,5(7,5) μ:

C. ovispermum (Fuck.) Sacc., Syll. **3**, 314. 1884 (pro errore *C. oospermum*); Pet. et Syd. in Fedde, Rep. Beih. **42**, 416. 1927; in ligno putri *Pini* in Rhenogovia nec non in ramulis subvivis *Cryptomeriae pugentis* in Am. bor. (Sacc., Nuovo Giorn. Bot. Ital. **27**, 82. 1920) ≡ *Phoma ovispermum* Fuck., Symb. Myc. pag. 161. 1869.

Species includendae:

C. colliculosum (Fr.) Sacc., Mich. **2**, 204. 1881; Syll. **3**, 314. 1884; in ligno abietino denudato in Gallia ≡ *Sphaeronema colliculosum* Fr. in Roum., Fungi Gallici Exsicc. no. 308. 1879.

C. albistratum (Peck) Sacc., Syll. **3**, 313. 1884; in cortice *Thujae orientalis* in Amer. bor. ≡ *Phoma albistrata* Peck, Bot. Gaz. Am. pag. 33. 1880.

C. pallido-fuscum Sacc., Mich. **2**, 105. 1880; Syll. **3**, 314. 1884; in foliis *Araucariae brasiliensis* in Gallia.

C. conorum Sacc. et Roum. in Sacc., Mich. **2**, 624. 1882 et Syll. **3**, 314. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 511. 1927; in squamis conorum *Abietis albae* in Gallia.

C. cedri Roll., Bull. Soc. Myc. France pag. 7. 1896; Sacc., Syll. **14**, 924. 1899; in strobilis *Pini cedri* in Gallia.

C. pini Oud. (non Cda.), Nederl. Kruidkund. Arch. 3 ser., **2**, 725. 1902; Sacc., Syll. **18**, 306. 1906; in foliis *Pini silvestris* in Hollandia.

C. olivaceum Bon. var. *pini- silvestris* Ferraris, Malpighia **15**, 25. 1902; Sacc., Syll. **18**, 304. 1906; in foliis emortuis et dejectis *Pini silvestris* in Italia bor.

C. conicola Vesterg., Bot. Notis. pag. 120. 1902; Sacc., Syll. **18**, 306. 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 390. 1927; in conis pendulis siccis *Pini silvestris* in Suecia; ≡ *C. rostellatum* Grove, Journ. of Bot. **24**, 135. 1886. pro parte; ≡ *Naemosphaera rostellata* Sacc., **10**, 260. 1892 pro parte; ≡

Microsphaeropsis rostellata v. Höhn., Oesterr. Bot. Zeitschr. pag. 103. 1916 pro parte.

AA. Cum stromate. Pycnidiosporis 4—5 × 2.7—3.5 aut 3.5 × 4 μ: (An *Coniothyrium* ?);

C. pityophilum (v. Höhn.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 391. 1927; in *Pino silvestri* in Norvegia; ≡ *Microsporella pityophila* v. Höhn., Hedw. **60**, 146. 1918.

Obsrv.:

C. pinastri (Lév.) Tassi (non Oud.), Bull. Orto Bot. Siena pag. 25, 1902; ad strobilos et folias *Pini silvestris* in Britannia; ≡ *Sphaeropsis pinastri* (Lév.) Sacc., Syll. **3**, 300. 1884; ≡ *Phoma pinastri* Lév., Ann. Sci. Nat. pag. 282. 1846; est species excludenda propter conidiorum magnitudinem.

C. pinastri Oud. [non (Lév.) Tassi], Nederl. Kruidk. Arch. **2**, ser. 3, 149. 1877, [In Sacc., Syll. **3**, 150. 1884 sub *Phoma pinastri* (Oud.) Sacc.]; ad squamas strobilorum maturorum *Pini pinastri* in Hollandia; secundum Pet. et Syd. in Fedde, Rep. Beih. **42**, 427. *Phoma pinastri* Sacc., l. c., est *Pleurothyriella pinastri* (Oud.) Pet. et Syd. (vide etiam Ann. Myc. **23**, 209. 1925).

C. rostellatum Grove, Journ. Bot. **24**, 135. 1886; Sacc., Syll. Add. **1—4**, 323. 1886; in interiore squamorum superficie conorum *Pini silvestris* in Britannia, secundum Pet. et Syd. in Fedde, Rep. Beih. **42**, 428. 1927, est *Ophiostomella rostellata* (Grove) Pet. et Syd., Ann. Myc. **23**, 238. 1925, in squamis conorum *Pini austriaca,* et pro parte (in Fedde, l. c. pag. 390) syn. *Coniothyrii conicolae* Vesterg.

C. glomerulatum Sacc., Mich. **1**, 209. 1878; Syll. **3**, 304. 1884; in bracteis strobilorum *Abietis excelsae* in Gallia, est, fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 422. 1927, *Phomopsis* sp.

C. pini Cda. (non Oud.), Ic. fung. **4**, 38. 1840; [in Sacc., Syll. **3**, 627. 1884, sub *Leptothyrium pini* (Cda.) Sacc.] est *Rhizosphaera pini* (Cda.) Maubl., Bull. Soc. Myc. France **23**, 171. 1907.

C. abietis (Oud.) v. Höhn., Hedw. **59**, 266. 1917; sec. Pet. et Syd., l. c. pag. 476, est species dubia.

C. myriocarpum (Fr.) Sacc. (vide *Coniothyria* in ligno) var. *abietinum* Karst., Symb. Myc. **15**, 156 (deest annus in Thesauro); Sacc., Syll. **3**, 315. 1884; in ligno *Abietis* in Fennia, est species excludenda propter conidiorum magnitudinem.

C. dispersellum Karst., Hedw. **23**, 41. 1884; Sacc., Syll. **3**, 314. 1884; in ligno pineo in Fennia, in cortice *Pini pinastri* in Lusitania (fide Gz. Fragoso, Bol. Soc. Brot 2, **2**, 58. 1924) est sec. Pet. et Syd., Ann. Myc. **22**, 323. 1924 et in Fedde, Rep. Beih. **42**, 420. 1927, species delenda.

C. domesticum P. Henn., Hedw. pag. 191. 1903; Sacc., Syll. **18**, 307. 1906; in ligno pineo udo fabrefacto in Germania (v. etiam

Died., Ann. Myc. **11**, 44, 1913), est fide Lohwag, Sydowia **6**, 273. 1952, *Cephalotheca trabea* Fuck.

In Betulaceis.

Pycnidiosporis 3—6 × 2—4 μ:

C. carpini-betuli (Sacc.) nob., n. comb. In *Carpino betulo* in Italia bor.

= *C. olivaceum* Bon. f. *carpini-betuli* Sacc., Mich. **1**, 205. 1878; Syll. **3**, 305. 1884.

= *C. betulae* Laubert, Arb. K. biol. Aust. f. Land-Forstwirtsch. **5**, 208. 1906; Sacc., Syll. **22**, 975. 1913. In ramulis languidis *Betulae* in Germania.

= *C. minutum* (Died.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 349. 1927. In ramis siccis *Betulae verrucosae* in Germania; ≡ *Haplosporella minuta* Died., Kryptfl. Mark Brandenburg **9**, 587. 1914 (Secundum Pet. et Syd. l. c. est etiam probabiliter = *C. betulae* Laubert).

Species includendae:

C. valsoideum Peck, 38 Rep. New York St. Mus. pag. 97. 1885; Sacc., Syll. Add. I—IV, 322. 1886; Pet. et Syd. in Fedde, Rp. Beih. **42**, 343. 1927. In ramis emortuis *Alni glutinosae* in Amer. bor.

= *C. alni* Siem., Act. Soc. Bot. Pol. **1**, 7. 1923; Pet. et Syd. l. c. pag. 344. In foliis languidis *Alni glutinosae* in Transcaucasia.

In Fagaceis.

Pycnidiosporis 4—8 × 2.5—3.5 μ:

C. microscopicum Sacc., Mich. **1**, 49. 1878; Syll. **3**, 311. 1884. [non (F. Tassi) Allesch. (v. in Urticaceis)]. In pagina inferiore foliorum languidorum *Quercus pedunculatae* in Italia bor.

= *C. truncisedum* Vesterg., Öfvers. af K. Vetensk. Akad. Förhandl. no. I, pag. 40. 1897; Sacc., Syll. **14**, 924. 1899; Pet. et Syd. in Fedde, Rep. Beih. **42**, 396. 1927. Ad truncum *Quercus* in Germania.

= *C. quercellum* P. Brun., Act., Soc. Linn. Bordeaux pag. 14 (extr.) 1898; Sacc., Syll. **14**, 924. 1899. In ramis junioribus *Quercus pedunculatae* in Gallia.

Observ.:

C. quercinum (Bon.) Sacc., Syll. **3**, 312. 1884; in ramis quercinis in Germania; ≡ *Clinterium quercinum* Bon., Abhandl. Geb. der Mykologie **2**, 145. 1870, referendum est ad species dubias propter descriptionem sine conidiorum dimensionibus.

C. amphistomoides Ade, Allg. Zeitschr. **30—31**, pag. 24 (136). 1926; in ligno putri *Fagi* in Germania, est species excludenda praecipue propter sporarum magnitudinem.

C. epiphyllum Cke. (non Linds. v. in Lichenibus), in Rav. Fungi Amer. exsicc. no. 244. 1879; Sacc., Syll. **22**, 974. 1913; in foliis languindis non maculatis *Quercus catesbeyi* in Amer. bor., est, fide Pet. et Syd., Ann. Myc. 22. 327. 1924, species delenda.

C. abnorme Sacc., Mich. **2**, 281. 1881; Sacc., Syll. **3**, 312. 1884; in ligno putri fagineo in Italia bor. est, fide Pet. et Syd. l. c. **23**, 230. 1925, species delenda.

C. quercicola Oud., Nederl. Kruidk. Archief. **3**, sér. II, pag. 725. 1902; Sacc., Syll. **18**, 306. 1906 (sub *C. quercicolum* Oud); in foliis *Quercus roboris* in Hollandia, est, fide Pet.. et Syd. in Fedde, Rep. Beih. **42**, 428. 1927, species dubia.

In Myricaceis.

Speciem unam in Myricaceis reperimus quae, fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 443. 1927 est excludenda quod syn. *Cytopleae myricae* (Karst.) Pet. et Syd. l. c.

C. myricae (Karst.) Died., Kryptfl. Mark Brandenburg **9**, 572. 1914; ≡ *Phoma myricae* Karst., Hedwigia **23**, 6. 1884; Sacc., Syll. **10**, 155. 1892; in ramis *Myricae gales* emortuis in Fennia.

In Juglandaceis.

Pycnidosporis 2.5—3.6 × 1.8—2 μ:

C. caryogenum F. V. Rand, Journ. Res. **1**, 330. 1914; Sacc., Syll. **25**, 238. 1884; in seminibus *Caryae illinoensis* in Amer. bor.

Observ.:

Adsunt autem pro parte in Juglandaceis:

— *C. incrustans* Sacc., Atti Soc. Venet. Trent. Sc. Nat. **4**, 114. 1875; Syll. **3**, 313. 1884; in ramis corticatis *Juglandis regiae* in Italia bor., (species excludenda, v. in Moraceis).

— *C. foedans Sacc.*, Mich. **1**, 65. 1877; Syll. **3**, 308. 1884; in ramis *Juglandis regiae* in Italia bor. (v. in Leguminosis).

— *C. tirolense* Bubák, Oesterr. Bot. Zeitschr. **54**, 183. 1904; in ramis siccis *Juglandis mandschuricae* fide Woll. et Hpfl., Z. Parasitenkde. **9**, 629. 1937 (v. in Rosaceis).

In Salicaceis.

A. Pycnidiosporis sphaericis 5—8 μ diam.:

C. populinum Schulz. et Sacc., Hedwigia **23**, 89. 1884; Sacc., **3**, 312. 1884; in ramis decorticatis *Populi* in Slavonia.

AA. Pycnidiosporis non sphaericis, minoribus val majoribus:

B. Pycnidiosporis minoribus 4—6.5 × 3—4.5 μ:

C. populi-nigrae (Sacc.) nobis, n. comb. In *Populo nigra* in Italia bor.

= *C. olivaceum* Bon. f. *populi-nigrae* Sacc., Mich. **1**, 205. 1878.
= *C. deviatum* Syd., Ann. Myc. **33**, 65. 1935; in foliis languidis *Populi ciliatae* in India.

Species includenda:

C. salicicola Rota-Rossi, Atti R. Ist. Bot. Pavia **11**, 307. 1905; Sacc., Syll. **22**, 975. 1913; in foliis *Salicis vitellinae* in Italia bor.

BB. Pycnidiosporis majoribus 7—10 × 5—6 usque 5.5 μ longis et 3—4 μ latis:

C. eurotioides Sacc., Mich. 2, 105. 1880; Syll. **3**, 312. 1884; in ramis *Salicis* et *Rubi* (Rosaceae) in Gallia.

Species includendae:

C. populi Oud., Ned. Kruidk. Arch. ser. 2, **5**, 496. 1888; Sacc. Syll. **10**, 269. 1892; Pet. et Syd. in Fedde, Rep. Beih. **42**, 394. 1927; in fragmentis ligneis ex *Populo nigra* in Hollandia.

C. spokanense Sacc., Nuovo Giorn. Bot. Ital. **27**, 82. 1920; Syll. **25**, 245. 1931; Pet. et Syd. in Fedde, Rep. Beih. **42**, 405. 1927; in ramis corticatis *Salicis sp.* in Amer. bor.

Observ.:

C. botryosphaerioides Sacc. et Briard., apud Sacc., Syll. **3**, 312. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 394. 1927; in ramis emortuis *Populi* in Gallia, excludendum est a Salicaceis quia parasiticum in *Gibberella* sp. (v. *Coniothyria* in Fungis).

C. ? populi Rich., Cat. Champ. Marn. no. 1647 ex Soc. Sci. et Arts Vitry. le. François. 8°, 14, pp. 587. 1889; Sacc., Syll. **10**, 265. 1892; in ramis *Populi* in Gallia, propter descriptionem sine pycnidiorum et sporarum dimensionibus est species dubia.

C. olivaceum Bon. var. *obovoideum* Karst., Hedwigia **23**, 61. 1884; Sacc., Syll. **3**, 305. 1884; in cortice et ligno ramorum *Populi tremulae* in Fennia, est *Melanopsamma* (fide Pet. et Syd., Ann. Myc. **12**, 324. 1924).

C. fuligineum (= *fuliginosum*) (Karst.) Sacc., Syll. **10**, 266. 1892; in ramulis decorticatis *Salicis capreae* in Fennia, ≡ *Sphaeropsis fuliginea* Karst., Act. Pro Fauna et Fl. Fenn. **6**, no. 2, 70. 1890; secundum Pet. et Syd., Ann. Myc. **22**, 326. 1924, est species excludenda vel delenda.

C. innatum Karst., Meddel. Soc. pro Fauna et Fl. Fenn. **13**, 162. 1886; Sacc., Syll. **10**, 269. 1892; in ligno vetusto salicino in Fennia est *Anthostoma melanotes* (B. et Br.) Sacc. fide Pet. et Syd., Ann. Myc. **22**, 323. 1924.

C. indicum Cke. et Mass., Grev. **16**, 70. 1888; Sacc., Syll. **10**, 265. 1892; secundum Pet. et Syd., Ann. Myc. **22**, 319. 1924, est species excludenda.

In Moraceis.

A. Pycnidiosporis 5—5.5 × 2.5 μ:

C. anserinum Sacc., Atti Soc. Venet. Trent. Sci. Nat. Padova **4**, 101—141. 1875; Syll. 3, 313. 1884; in ramis decorticatis *Broussonetiae papyriferae* nec non *Fici caricae* in Italia bor. et in Gallia [sec. Woll. et Hpfl., Z. Parasitenkde. **9**, 632. 1937 pro syn. dubio *C. lignorum* Sacc. (v. *Coniothyria* in ligno)].

Species includendae:

C. lupulinum Bres., Malpighia, **11**, 311. 1897; Sacc., Syll. **14**, 924. 1899; in sarmentis *Humuli lupuli* in Italia bor.

C. cannabinum Curzi, Atti Ist. Bot. Univ. Pavia ser. 3, **3**, 206. 1927; in caulibus siccis *Cannabis sativae* in Italia bor.

AA. Pycnidiosporis 7.5—10 × 3.5—6 μ:

C. mororum Briosi et Farn., Avizz. germ. gelso, pag. **64**, Rend. Accad. Linc. 1901; Sacc., Syll. **16**, 1155. 1902; Syll. **18**, 306. 1906; in cicatricibus foliorum ad ramulos vivos *Mori albae* in Italia bor.

Species includenda:

C. humuli Hollós. Ann. Mus. Nat. Hung. **5**, 53. 1907; Sacc. Syll. **22**, 974. 1913; in sarmentis *Humuli lupuli* in Hungaria et Hispania (v. Gz. Frag., Bol. R. Soc. Españ. Hist. Nat. **23**, 5. 1925).

Observ.:

C. incrustans Sacc., Atti Soc. Venet. Trent. Sc. Nat. **4**, 114. 1875; Syll. **3**, 313. 1884; in ramis corticatis *Broussonetiae, Albizziae julibrissin* (Leguminosae), *Rhois thyphinae* (Anacardiaceae), *Juglandis regiae* (Juglandaceae), in Italia bor., fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 449. 1927, est probabiliter *Cytoplea juglandis* (Schum.) Pet. et Syd. l. c.; fide Keissler, Ann. Myc. **21**, 78. 1923 est contra species probabiliter includenda in *Coniosporio berberidis.*

C. minus (Ell. et Barth.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 380. 1927; in ramis siccis *Maclurae aurantiacae* in Amer. bor. ≡ *Haplosporella minor* Ell. et Bath., Transact. Kansas Acad. of Sc. **16**, 1897—98 pag. 166. 1899; ≡ *Sclerothyrium minor* v. Höhn., Hedw. **60**, 145 et 181. 1918; est species dubia.

C. paradoxum (Brun.) Sacc., Syll. **3**, 313. 1884; in ramis siccis *Broussonetiae papyriferae* in Gallia ≡ *Phoma paradoxa* Brun., Rev. Myc. **4**, 98. 1882; est, fide Pet. et Syd. in Fedde, Rep. Beih. 42, 427. 1927, *Diplodia incrustans* Sacc.

Adest autem in Moraceis pro parte: *C. foedans* Sacc., Mich. **1**, 65. 1877; Syll. **3**, 308. 1884; in ramis corticatis *Mori albae* in Italia bor. (Vide in Leguminosis).

Pycnidiosporis (3)4—7 × (2)2,5—4(5) μ:

C. celtidis-australis (Sacc.) nob., n. comb. In *Celtide australi* in Italia bor.

= *C. olivaceum* Bon. *f. celtidis-australis* Sacc., Mich. **1**, 205. 1878; Syll. **3**, 305. 1884.

= *C. celtidis* Brun., Rev. Myc. **9**, 14. 1887; in ramis emortuis *Celtidis occidentalis* (fide Brunaud l. c.); in ramis emortuis *Celtidis australis* (fide Sacc., Syll. **10**, 265. 1892).

Species includendae:

C. ulmi Tharp [non (Karst.) Fl. Tassi], Mycologia **9**, 116. 1917; Sacc., Syll. **25**, 246. 1931; in foliis vivis *Ulmi campestris* in Amer. bor.

C. radicicola Tehon, Mycologia **29**, 442. 1937; in partibus corticalibus radicium emortuorum *Ulmi americanae* in Amer. bor.

Observ.:

C. ulmeum Karst., Hedwigia **23**, 63. 1884; Sacc., Syll. **3**, 313. 1884; in ramis emortuis *Ulmi* in Fennia, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 447. 1927, est *Cytoplea ulmea* (Karst.) Pet. et Syd. Quamvis sec. Woll. et Hpfl., Z. Parasitenkde. **9**, 611. 1937 sit species valida, certe excludendam esse videtur propter basidios "aliis hyphoideis, septatis, sparsim ramosis" (ex Woll. et Hpfl.).

C. cruciatum Fuckel, Symb. Myc. pag. 173. 1869; in ramis *Ulmi campestris* in Italia bor. fide Fuckel, l. c., est *Cucurbitaria naucosa* Kokl.

C. karstenii (Sacc. et Syd.) Allesch. in Rabh. Krypt. Fl. Deutschl. **7**, 58. 1901; in ramulis marcescentibus *Ulmi* in Fennia ≡ *Sphaeropsis karstenii* Sacc., et Syd., Syll. **14**, 922. 1899 ≡ *Sphaeropsis ulmi* Karst. in Meddel. Soc. pro Fauna et Fl. Fennica **16**, 42. 1888, est contra, fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 113. 1927, *Sphaeropsis ulmi* Karst. l. c. quae est etiam species excludenda.

C. ulmi (Karst.) Fl. Tassi [non Tharp], Bull. Orto Bot. Siena pag. 26. 1902; in ramulis decorticatis *Ulmi* in Fennia ≡ *Sphaeropsis ulmi* Karst., l. c. (non Sacc. et Roum.) ≡ *Sphaeropsis karstenii* Sacc. et Syd. in Sacc., Syll. **14**, 922. 1899.

C. glomeratum Cda., Ic. Fung. **4**, 108. 1840; in Sacc., Syll. **3**, 175. 1884 sub *Aposphaeria glomerata* (Cda.) Sacc.; in asseribus lignisque *Ulmi* in Bohemia et Britannia, est, sec. Woll. et Hpfl., Z; Parasitenkde **9**, 601. 1937, *Phoma glomerata* (Cda.) Woll. et Hpfl., Z. Parasitenkde **8**, 592. 1936.

Descripta sunt autem in Ulmaceis sine nomine specifico *Coniothyria* sequentia:

C. "A" Harris, Bull. Illinois Dept. Registr. a. Educ. Div. Nat. Hist. Survey **20**, Art. 1, 1932; in *Ulmo americana* in Amer. bor. quod Woll.

et Hpfl. in Z. Parasitenkde **9**, 616. 1937, indicant ut probabile synonimum *C. concentrici* (Desm.) Sacc. (v. in Liliaceis).

C. "B" Harris, l. c.; in *Ulmo americana* in Amer. bor., quod Woll. et Hpfl., l. c. pag. 614, indicant ut Syn. *Coniothyrii fuckelii* Sacc. (v. in Rosaceis).

Adsunt pro parte in Ulmaceis:

C. olivaceum Bon. (v. in Araliaceis); in *Ulmo* sp. (fide Woll. et Hpfl., l. c. pag. 621); et *C. insitivum* Sacc. (species excludenda v. in Leguminosis); in ramulis *Ulmi campestris*.

In Urticaceis.

Pycnidiosporis 4—6 × 2—3,5 μ:

C. parietariae Sacc. et Speg., Mich **1**, 204. 1877; Sacc., Syll. **3**, 317. 1884; in radicibus emortuis *Parietariae officinalis* in Italia bor. (Sec. Woll. et Hpfl., Z. Parasitenkde **9**, 634. 1937, est contra probabiliter syn. *C. lignorum* Sacc., v. *Coniothyria* in ligno).

Species includenda:

C. syconophilum Schulz. et Sacc., Hedw. **23**, 89. 1884; Sacc., Syll. **3**, 312. 1884; in ramis corticatis *Fici caricae* in Slavonia.

Observ.:

C. microscopica (Fl. Tassi) Allesch., in Rabh. Krypt. Fl. Deutschl. **7**, 919. 1903; in foliis exiccatis *Fici repentis* in Italia centr., sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 111. 1927 (ut *C. microscopicum* Allesch. signatum) est syn. *Sphaeropsidis microscopicae* Tassi in Bull. Orto bot. Siena **2**, 31. 1899 (quae est etiam excludenda).

Adsunt autem pro parte in Urticaceis:

C. anserinum Sacc. (v. in Moraceis) in ramis decorticatis *Fici caricae* in Italia bor.; *C. conoideum* Sacc. (v. in Umbelliferis), in caule putri *Urticae* in Gallia nec non *C. fuckelii* Sacc. (v. in Rosaceis) quia sec. Woll. et Hpfl., Z. Parasitenkde **9**, 614. 1937 habet ut syn. *C. conoideum* Sacc.

In Proteaceis.

C. proteae-abyssinicae Bacc., F. Etiop. **2**, no. 103 in Pirotta, Ann. Bot. 1917; Sacc., Syll. **25**, 243. 1931; in *Protea abyssinica* in Africa or., propter conidiorum magnitudinem est species excludenda.

In Loranthaceis.

Pycnidiosporis 5—7 × 3—4 vel 3,5—5 μ (Pet. et Syd.):

C. visci (Gz. Frag.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 415. 1927; in ramulis siccis *Visci laxi* in Hispania.

≡ *C. olivaceum* Bon. f. *visci* Gz. Frag., Bol. R. Soc. Españ. Hist. Nat. **18**, 374. 1931.

In Polygonaceis.

Pycnidiosporis 5—7 × 3—4 μ:

C. rumicis Pet., Ann. Myc. **18**, 124. 1920; Sacc., Syll. **25**, 243. 1931; in caulibus siccis *Rumicis obtusifolii* in Bohemia.

Observ.:

C. eriogoni Earle ap Greene, Plant. Baker. **2**, fasc. 1, 25. 1901; Sacc., Syll. **16**, 1154. 1902; Syll. **18**, 305. 1906; in caulibus emortuis *Eriogoni umbellati* in Amer. bor. (in Baker, Plant. South Color. no. 19 ut *C. eriogonatum* pro errore), sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 366. 1927, est verisimiliter *Ascochytella* sp. cum conidiis unicellularibus.

C. polygoni Hollós, Növényt. Közlemén. **4**, 6 (extr.) 1907; Sacc., Syll. **22**, 974. 1913; in caulibus siccis *Polygoni lanigeri* in Hungaria, praecipue propter conidiorum magnitudinem est species excludenda.

C. atraphaxidis Esf., Sydowia **4**, 26. 1950; in ramis siccis interdum decorticatis *Atraphaxidis spinosae* in Persia, est probabiliter *Diplodia* vel *Camarosporium*.

In Chenopodiaceis.

A. Pycnidiosporis 5—8 × 3—6 μ:

C. halymi (Cast.) Sacc., Mich. **2**, 371. 1881; Syll. **3**, 316. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 348. 1927; in foliis languidis nec non in caulibus ramulisque siccis *Atriplicis halymi* in Gallia.

≡ *Sphaeria halymi* Cast.-ubi?

≡ *C. atriplicis* Maubl., Bull. Soc. Myc. France **19**, 293. 1903; Sacc., Syll. **18**, 305. 1906; in ramulis *Atriplicis halymi* in Gallia.

= *C. atriplicinum* Wint., Hedw. **23**, 174. 1884; Sacc., Syll. **16**, 911. 1902; Pet. et Syd. in Fedde, Rep. Beih. **42**, 347. 1927; in calyce *Atriplicis nummularii* in Australia.

= *C. obionis* Jaap, Schr. Naturwiss. Verein f. Schlesw.-Holst. **14**, 29. 1907; Sacc., Syll. **22**, 974. 1913; Pet. et Syd. in Fedde, Rep. Beih. **42**, 383. 1927; in ramulis siccis *Obionis* (= *Atriplicis*) *portulacoidis* in Germania.

Species includenda:

C. olivaceum Bon. var. *salsolae* Fairm., Mycol. **10**, 257. 1918; Sacc., Syll. **25**, 248. 1931; in caulibus vetustis *Salsolae pestiferae in* Amer. bor.

AA. Pycnidiosporis 3—6 × 2,5—3 μ:

C. mediellum Karst., Symb. Myc. Fenn. **23**, 10. 1888; Sacc., Syll. **10**, 262. 1892; in caulibus *Chenopodii albi* emortuis in Fennia.

Species includendae:

C. kochiae Săvul. et Sandu, Hedw. **75**, 205. 1936; in ramulis emortuis *Kochiae prostratae* in Dacia.

Observ.:

Fide Pet. et Syd. in Fedde, Rep. Beih. **42**. 1927, sunt dubiae species sequentes:

C. globiparum Bubák, Ann. Naturhist. Mus. Wien. **28**, 209. 1914; Sacc., Syll. **25**, 234. 1931; in caulibus *Salsolae rigidae* var. *villosae* in Mesopotamia et in Arabia bor. (Pet. et Syd. l. c. pag. 421).

C. senneni Gz. Frag., Mem. R. Acad. Cienc. art. Barcelona, 3, **15**, no. 17, 13. 1920; Sacc., Syll. **25**, 234. 1931; in ramulis *Salsolae kali* in Hispania (Pet. et Syd. l. c. pag. 429).

C. diedickeanum Reichert, Engl. Bot. Jahrb. **56**, 713. 1921; in caulibus aridis *Anabasis articulatae* in Aegypto (Pet. et Syd. l. c. pag. 344).

In Amaranthaceis.

C. amaranthi (Fl. Tassi) Sacc. et D. Sacc., Syll. **18**, 310. 1906 ≡ *Phyllostictella amaranthi* Tassi, Bull. Lab. Orto Bot. Siena **4**, 4. 1901; in foliis vivis *Amaranthi caudati* in Italia centr. est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 417. 1927 species excludenda.

In Phytolaccaceis:

Pycnidiosporis 5—7 × 3—4 μ:

C. phytolaccae Hollós, Ann. Mus. Nat. Hungar. **7**, 55. 1909; Sacc., Syll. **22**, 974. 1913; in caulibus siccis decorticatis *Phytolaccae decandrae* in Hungaria.

In Cactaceis.

Pycnidiosporis 3—8 × 3—4 μ usque 10 × 5 μ:

C. opuntiae Vogl., Ann. Accad. Agric. Torino **55**, 213. 1912; Sacc., Syll. **25**, 233. 1931; in cladodiis *Opuntiae fici-indicae* in Italia bor.

= *C. opuntiae* P. Henn. apud Diedicke, Kryptfl. Mark Brandenburg **9**, 572. 1914; Pet. et Syd. in Fedde Rep. Beih. **42**, 385. 1927; in baccis siccis *Opuntiae* sp. in Germania (sec. Woll. et Hpfl., Z. Parasitenkde **9**, 620. 1927 est propabiliter syn. *C. olivacei* Bon.).

≡ *C. henningsianum* Trotter in Sacc., Syll. **25**, 233. 1931; in fructibus siccis *Opuntiae* sp. in Germania.

Observ.:

C. globulisporum Speg., An. Soc. Cient. Argentina **26**, 63, 1888; Sacc., Syll. **10**, 265. 1892; ad corticem languidum *Cactorum* incultis in Amer. austr., secundum Pet. et Syd. in Fedde, Rep. Beih. **42**, 422.

1927 est species excludenda [In Pet. et Syd., Ann. Myc. **23**, 274. 1925 pro errore descriptum ut *C. globisporum* Speg. (non Bubák v. in Tamaricaceis)].

In Caryophyllaceis.

Pycnidiosporis 3,5—5,5 × 3—6 μ:

C. saponariae Sacc. et Speg., Mich. **1**, 204. 1878; Sacc., Syll. **3**, 316. 1884; in caulibus emortuis *Saponariae officinalis* in Italia bor.

Species includendae:

C. pampanianum Sacc., Notae Myc. **22**, 177. 1917; Syll. **25**, 233. 1931; in caulibus emortuis subputrescentibus *Dianthi caryophylli* v. *virginei* in Italia bor.

= *C. dianthicola* Alcalde, An. Jard. bot. Madr. t. 6, **2**, 411. 1945; in caulibus emortuis *Dianthi brachyanthi* in Hispania.

C. fuckelii Sacc. f. *corrigiolae* Gz. Frag., Brotéria ser. bot. **21**, 8. 1924; in foliis siccis *Corrigiolae telephiifoliae* in Gallia.

In Euphorbiaceis.

Pycnidiosporis 2,5—7 × 2,5—3,5 μ:

C. silvaticum Sacc. et Malbr., Mich. **2**, 624. 1882; Sacc., Syll. **3**, 316. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 366. 1927: in caulibus et ramis siccis *Euphorbiae silvaticae* in Gallia.

= *C. euphorbiae* (Roum.) Berl. et Vogl., in Sacc., Syll. add. I—IV, 323. 1886; Syll. **10**, 261. 1892; in foliis vivis *Euphorbiae silvaticae* in Gallia.

= *C. gattefossei* Duv. et Maire ap. Maire, Bull. Soc. Hist. Nat. de l'Afrique du Nord, **12**, 23. 1921; in *Euphorbia resinifera* in Africa bor.

= *C. concentricum* (Desm.) Sacc. f. *gattefossei* (Duv. et Maire), Biga, Riv. Ortoflorofrutt. ital. **41**, 53. 1957; in plantis vivis et languidis *Euphorbiae resiniferae* nec non *E. hermentianae, E. hermentianae tetrae, E. bojeri, E. splendentis, E. ledieni, E. erythraeae, E. triangularis, E. grandidentis, E. alcicornis* in Africa bor. et Italia.

Species includenda:

C. heveae Saccas, Agron. trop. Nogent **8**, 195. 1953; in foliis vivis *Heveae brasiliensis* in Africa aequat. et Gallia.

Observ.:

C. euphorbicola Hollós, Ann. Mus. Nat. Hung. **5**, 464, 1907; Sacc., Syll. **22**, 971. 1913; in caulibus siccis *Euphorbiae palustris* in Hungaria, est propter sporarum et sporophororum magnitudinem species excludenda.

In Platanaceis.

A. Pycnidiosporis 7 × 4 µ:

C. mixtum Fuck., Symb. Myc. pag. 377. 1869; Sacc., Syll. **3**, 313. 1884; in ramis putridis decorticatis *Platani orientalis* in Germania.

AA. Pycnidiosporis 2,5—3,5 × 1,5 µ:

C. platani Sacc., Mich. **1**, 206. 1878; Syll. **3**, 313. 1884; in ramis corticatis *Platani orientalis* in Italia bor.

Observ.:

Secundum Pet. et Syd., in Fedde, Rep. Beih. **42**, 445. 1927, *C. platani* Sacc. est syn. *Cytopleae platani* (Sacc.) Pet. et Syd. l. c., sed Woll. et Hpfl., Z. Parasitenkde **9**, 608. 1937, improbant generi *Coniothyrii* divisionem in *Cytoplea* et hanc speciem describunt ut validam.

In Magnoliaceis.

Pycnidiosporis 5—7 × 3—4 µ:

C. magnoliae (West.) Sacc. et Trav., Syll. **19**, 400. 1910; Syll. **22**, 967, 1913; in foliis *Magnoliae grandiflorae* in Belgio.

≡ *Monoplodia magnoliae* West., Bull. Acad. roy. Beld. ser. 2, **7**, 21. (extr.). 1859.

= *C. olivaceum* Bon. f. *magnoliae-grandiflorae* Sacc., Mich. **1**, 205. 1878; Syll. **3**, 305. 1884; in foliis; in Italia bor. [Fide Woll. et Hpfl., Z. Parasitenkde **9**, 620. 1937 = *C. olivaceum* Bon. (v. in Araliaceis)].

= *C. tephrosporum* (Berk. et Curtis) Fl. Tassi, Bull. Orto bot. Siena, pag. 25. 1902; in ramis *Magnoliae* in Amer. bor. ≡ *Sphaeropsis tephrospora* Berk. et Curtis, Ann. and Mag. Nat. Hist. 3, **4**, 284. 1859; Sacc., Syll. **3**, 292. 1884.

Observ.:

C. micheliae (P. Henn.) Allesch., in Rabh. Krypt. Fl. Deutschl. **7**, 920. 1903 in foliis *Micheliae fuscatae* in Italia, est, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 111. 1927, *Sphaeropsis micheliae* P. Henn., Verhandl. Bot. Verein Prov. Brandenburg **40**, 160. 1898 (etiam excludenda).

In Calycanthaceis.

Pycnidiosporis 5—6,5 × 2,5—5 µ:

C. calycanthi-floridi (Sacc.) nob., n. comb.; in planta eiusdem nominis in Italia bor.

= *C. olivaceum* Bon. f. *calycanthi-floridi* Sacc., Mich. **1**, 205. 1878; Syll. **3**, 305. 1884.

Species includenda:

C. chimonanthi Kühn.-Lordat et J. P. Barry, Bull. Soc. Myc. Fr. **65**, 129. 1949; in foliis vivis *Chimonanthi fragrantis* in Gallia.

In Monimiaceis.

In hac Familia speciem unam reperimus quae sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 350. 1927 est ad genus *Microdiplodia* referenda: *C. boldoe* Speg., Rev. Fac. Agron. Vetrin. Le Plata **6**, 154. 1910; Sacc., Syll. **22**, 971. 1913; in ramulis siccis *Boldoae fragrantis* in Chile.

In Lauraceis.

A. Pycnidiosporis 4—8 × 2—4 μ:

C. lauri-nobilis (Brun.) nob., n. comb. In ramis emortuis *Lauri nobilis* in Gallia.

= *C. olivaceum* Bon. f. *lauri-nobilis* Brun., Rev. Myc. **8**, 140. 1886: Sacc., Syll. Add. **1—4**, 322. 1886; Syll. **10**, 265. 1892.

Species includendae:

C. peumi Speg., Bul. Acad. Nac. Ci. Cordoba **25**, 102. 1921; in foliis vivis *Cryptocaryae peumi* in Hispania.

C. insigne Syd., Ann. Myc. **22**, 431. 1924; Pet. et Syd. in Fedde, Rep. Beih. **42**, 384. 1927; in partibus foliorum *Ocoteae bullatae* a gallis occupatis in Africa austr.

AA. Pycnidiosporis 2—2,5 μ diam.:

C. microsporum Fl. Tassi, Bull. Lab. Orto Bot. Siena pag. 125; 1900; Sacc., Syll. **16**, 911. 1902; in baccis putridis *Lauri nobilis* in Italia.

Observ.:

Adest autem in *Lauraceis* pro parte: *C. fuckelii* Sacc., Nuovo Giorn. bot. Ital. **8**, 200. 1876; in ramulis *Lauri nobilis* in Lusitania (fide Da Camara, Agron. lusit. **10**, 305. 1948). (v. in Rosaceis).

In Menispermaceis.

C. cocculi Gz. Frag., Trab. Mus. Nac. Cienc. Nat. Madrid Ser. Bot. no. 12, pag. 47. 1917; Sacc., Syll. **25**, 241. 1931; in ramulis emortuis *Cocculi japonici* in Hispania, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 420. 1927, est *Phlyctaena vagabunda* Desm.

In Ranunculaceis.

Pycnidiosporis 3—7,5 × (1)2—3,5 μ:

C. hellebori Cke. et Mass., Grev. **15**, 108. 1887; Sacc., Syll. **10**, 261. 1892; Pet. et Syd. in Fedde, Rep. Beih. **42**, 372. 1927; in foliis languentibus *Hellebori nigri* nec non *H. viridis, H.* sp. p., in Britannia, Moravia, Helvetia, Albania, Istria, Austria, Germania, Italia bor. et Gallia.

≡ *Septoria hellebori* Thuem., Fung. austr. no. 898, nomen nudum.

≡ *Coniothyrium hellebori* Delacr., Bull. Soc. Myc. France **6**, 183. 1890.

≡ *Phyllostictella hellebori* Fl. Tassi, Bull. Lab. Orto Bot. Siena **4**, 5. 1901.
≡ *C. delacroixii* Sacc., Syll. **10**, 261. 1892.
≡ *Phyllostictella delacroixii* Fl. Tassi, l. c. pag. 5. 1901.
≡ *C. olympicum* Allesch., Hegwigia **36**, 162. 1897; Sacc., Syll. **14**, 922. 1899 (1).
≡ *Phyllostictella olympica* Fl. Tassi, l. c. pag. 5. 1901.
≡ *C. hellebori* Cke. et Mass. var. *hellebori-viridis* C. Massal. in Mad. Verona **2**, 10 (extr.). 1908; Sacc., Syll. **22**, 966. 1913.
≡ *Dothisphaeropsis hellebori* V. Höhn., Ber. Deutsch. Bot. Ges. **36**, 315. 1918 et in Sitzb. Akad. Wiss. Wien, Math. nat. Kl. Abt. I, **128**, 616. 1919.

Species includendae:

C. paeoniae Montemartini, Riv. Patol. Veget. pag. 235. 1915; Sacc., Syll. **25**, 243. 1931; in foliis vivis *Paeoniae officinalis* in Italia bor.

C. clematidis-rectae Pet., Fungi pol. exs. no. 576. 1921 et in Fedde, Rep. Beih. **42**, 356. 1927; in ramis siccis *Clematidis rectae* in Galicia. ≡ *Coniothyrinula clematidis rectae* Pet., Hedwigia **65**, 256. 1925.

C. carpaticum Pet. in Fedde, Rep. Beih. **42**, 341. 1927; in ramis siccis *Aconiti moldavici* in Montibus Carpatibus Centr. ≡ *Coniothyrinula carpatica* Pet., Ann. Myc. **21**, 2. 1923.

C. bulgaricum Bub. et Picbauer, Ann. Myc. **35**, 145. 1937; ad ramos vivos *Clematidis vitalbae* in Bulgaria.

Observ.:

C. isopyri Fl. Tassi, Bull. Lab. Orto Bot. Siena **5**, 24, 1902; in caulibus, raro etiam foliis capsulisque *Isopyri fumarioidis* in desertis Sibiriae, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 110. 1927 est syn. *Sphaeropsidis isopyri* Thuem., Bull. Soc. Impér. des Nat. de Moscou **60**, 226. 1880 (speciei etiam excl.).

Adest autem pro parte in Ranunculaceis *C. olivaceum* Bon. (v. in Araliaceis), nam sec. Keissler, Ann. Myc. **21**, 73. 1923 *Aposphaeria clematidea* Sacc. et Fautr., Rev. Myc. **20**, 58. 1898 in sarmentis siccis *Clematis vitalbae* in Gallia est *C. olivaceum* Bon.

(1) *C. olympicum* Allesch. var. *foetidum* Ade, Mitteil. Bad. Landesver. Naturk. Naturschutz Freiburg, I. Br., N. F. I, 331. 1924; in caulibus *Hellebori foetidi* in Germania, est, sec. Pet. et Syd. l. c. pag. 377, sine dubio forma caulicola *C. hellebori* Cke. et Mass.

In Berberidaceis.

Pycnidiosporis 3—6,5 × 3—4,5 μ:

C. berberidis-vulgaris (Sacc.) nob., n. comb.; in *Berberide vulgari* in Italia bor.

= *C. fuckelii* Sacc. f. *berberidis-vulgaris* Sacc., Mich. **1**, 207. 1878.

= *C. berberidicolum* Pet., in Fedde, Rep. Beih. **42**, 349. 1927; in ramis siccis *Berberidis vulgaris* in Moravia.

Observ.:

C. bergii Speg., An. Soc. Cient. Arg. Buenos Aires **10**, 33. 1888; ad spinas vivas *Berberidis heterophyllae* in Amer. austr. praecipue propter conidiorum magnitudinem est species dubia.

C. berberidis Fautr., Rev. Myc. pag. 124. 1890; Sacc., Syll. **10**, 263. 1892; in ramulis *Berberidis vulgaris* in Gallia, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 419. 1927 est species delenda; sec. Keissler, Ann. Myc. **21**, 78. 1923 referenda est ad *Coniosporium aterrinum* Cda.

Adest autem pro parte in Berberidaceis (in ramulis *Berberidis*) *C. insitivum* Sacc. (species excludenda v. in Leguminosis).

In Sarraceniaceis.

C. darlingtoniae (P. Henn.) Allesch. in Rabh., Krypt. Fl. Deutschl. **7**, 919. 1903 ≡ *Sphaeropsis darlingtoniae* P. Henn., Verh. d. Bot. Ver. der Provinz Brandenburg, **40**, 167. 1898; Sacc. et Syd., Syll. **16**, 906. 1902, in foliis *Darlingtoniae californicae* in Germania, est, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**. 109. 1927, syn. *Sphaeropsidis darlingtoniae* P. Henn. (etiam excludendae).

In Capparidaceis.

Pycnidiosporis 2,5—3,5 × 1—1,5 µ:

C. karelii Pet., Sydowia **7**, 32. 1953; in ramis decorticatis *Capparidis spinosae* in Asia minore.

Observ.:

C. tenue Bubàk (non Died. v. in Graminaceis) Ann. Naturhist. Mus. Wien **28**, 211. 1914; Sacc., Syll. **25**, 233. 1931 in caulibus emortuis *Cleomis glaucae* in Arabia bor., sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 430. 1927, est, species excludenda.

Adest autem pro parte in Capparidaceis (in ramis siccis *Capparidis spinosae* in Mesopotamia v. Pet., Ann. Naturhist. Mus. Wien **52**, 376. 1941 publ. 1942) *C. rude* Bub. species excludenda (v. in Leguminosis).

In Cruciferis.

A. Pycnidiorum pariete basaliter incrassato-convexa:

C. chanousianum (Sacc.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 513. 1927; in caulibus siccis *Brassicae monensis* in Italia bor.

≡ *Naemosphaera chanousiana* Sacc., Nuovo Giorn. Bot. Ital. **24**, 40. 1917.

AA. Pycnidiorum pariete basaliter non incrassato-convexa:

C. orbicula (Ell. et Ev.) Keissler, Ann. Naturhist. Mus. Wien **35**, 21. 1922; in foliis *Armoraciae* in Amer. bor.

≡ *Phyllosticta orbicula* Ell. et Ev., Proced. Acad. N. Sc. Philad. pag. 455. 1893; Sacc., Syll. **11**, 477. 1895.

Species includenda:

C. cheiranthi Zerova, Journ. Inst. Bot. Acad. Sci. de la R.S.S. Ukraine no. 21—22, pag. 338. 1939; in caulibus foliisque vivis *Cheiranthi cheiri* in Rossia.

Observ.:

C. lesquerellae Lind, Meddel. om Gronland **43**, 16. 1910; Sacc., Syll. **22**, 967. 1913; in caulibus emortuis *Lesquerellae* (= *Vesicariae*) *arcticae* in Groenlandia, est, sec. Pet. et Syd. Ann. Myc. **22**, 324. 1924, species dubia.

C. crepinianum Sacc. et Roum. (in Sacc., Syll. **3**, 315. 1884) var. *lusitanica* Gz. Frag., Bol. Soc. Brot. ser. 2, **2**, 58 (extr.). 1924; in caulibus siccis putridis *Brassicae oleraceae* in Lusitania, est, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 420. 1927, species dubia.

In Cistaceis.

Pycnidiosporis 7—9.8 × 6—7 usque 10—12 μ:

C. polyphagum Bausà-Alcalde, An. Jard. Bot. Madr. **5**, 158. 1945; in ramis caulibusque siccis *Halimii ocymoidis* (Kam.) Willk. *erecti* Willk. nec non *H. umbellati* Spach. *verticillati* (Brot.) Willk. in Hispania.

Observ.:

Adest autem pro parte in Cistaceis: *C. fuckelii* Sacc., Nuovo Giorn. Bot. Ital. **7**, 318. 1875; Syll. **3**, 306. 1884; in *Helianthemo* in Italia, Gallia, Germania, Austria, (v. in Rosaceis).

In Tamaricaceis.

A. Pycnidiosporis globosis . . . . . B

AA. Pycnidiosporis non globosis: 4,5—9 × 4—6 μ:

C. tamarisci (Mont.) Pet. Ann. Myc. **23**, 48. 1925; Pet. et Syd. in Fedde, Rep. Beih. **42**, 381. 1927; in ramis siccis *Tamaricis* et *Myricariae* nec non in matricibus synonimorum sequentium:

≡ *Clisosporium tamarisci* Mont., Ann. Sc. Nat. 4 ser. **5**, 341. 1856.

≡ *Phoma tamarisci* Sacc., Syll. **3**, 94. 1884.

≡ *Coniothyrium caespitulosum* Sacc., Mich. **1**, 206. 1878; Syll. **3**, 311. 1884; in ramulis *Tamaricis gallicae* in Italia bor. et in Gallia[1]).

≡ *Phoma africana* Speg., Rev. Myc. **2**, 161. 1880.

≡ *Dothiorella myricariae* f. *germanica* Allesch., Hedwigia **36**, 161. 1897.

[1]) Sec. Died., Ann. Myc. **11**, 44. 1913, *C. caespitulosum* Sacc., ad *Haplosporellam* transferendum est cum *Phoma tamarisci* (Mont.) Sacc. pro parte exempli Mycoth. March. no. 4838.

≡ *Coniothyrium tamariscis* Oud., Nederl. Kruidk. Arch. 3 sér. **2**, 257. 1901; Sacc., Syll. **16**, 909. 1902; in ramis tenellis *Tamaricis gallicae* in Hollandia.

≡ *C. fluviatile* Kab. et Bub., Oesterr. Bot. Zeitschr. **54**, 28. 1904; Sacc., Syll. **18**, 303. 1906; in ramulis emortuis *Myricariae germanicae* in Italia bor. et (fide Săvul. et Sandu, Hedw. **75**, 205. 1936) in Rumania.

≡ *C. tamariscis* P. Henn. in Kab. et Bub., Fung. imperf. exs. no. 458. 1907; Sacc., Syll. **22**, 968. 1913; in ramis *Tamaricis gallicae* in Germania.

≡ *Haplosporella caespitulosa* Died., Krypt. Fl. Mark Brandenburg **9**, 588. 1914.

≡ *Coniothyrium henningsii* Gz. Frag., Trab. Mus. Nac. Cienc. Nat. Madr. Ser. Bot. no. 12, pag. 48. 1917.

≡ *Sclerothyrium tamarisci* v. Höhn., Hedwigia **60**, 181. 1918.

B. Pycnidiosporis 2,5—6 μ diam.:

C. tamaricellum Brun., Act. Soc. Linn. Bordeaux pag. 14 (extr.). 1898; Sacc., Syll. **14**, 923. 1899; in ramulis emortuis *Tamaricis anglicae* in Gallia.

BB. Pycnidiosporis 7—11 μ diam.:

C. globisporum Bubák et Serebrianikow in Bub., Hedw. **57**, 342. 1916; Sacc., Syll. **25**, 245. 1931; [non *C. globisporum* Speg. sub quo nomine descriptum est pro errore *C. globulisporum* Speg. (v. in Cactaceis)]. In ramulis emortuis *Tamaricis pallasii* var. *brachystachydis* in Turkestania.

In Turneraceis.

Pycnidiosporis 5—6 × 3 μ:

C. turnerae Fl. Tassi, Bull. Lab. Orto Bot. Siena pag. 17. 1900; Sacc., Syll. 16, 909. 1902; in ramulis emortuis *Turnerae diffusae* in Amer. austr.

In Guttiferis.

Pycnidiosporis 3—4 × 2—2,5 μ vel 2,5—3 μ diam.:

C. hyperici P. Henn., Verh. Bot. Ver. Prov. Brandenburg **47**, 221. 1905; Sacc., Syll. **22**, 967. 1913; Pet. et Syd. in Fedde, Rep. Beih. **42**, 375. 1927; in caulibus siccis *Hyperici perforati* in Germania.

Observ.:

Haec species sec. Woll. et Hpfl., Z. Parasitenkde **9**, 614. 1937 est syn. *Coniothyrii fuckelii* Sacc., Nuovo Giorn. Bot. Ital. **8**, 200. 1876 (v. in Rosaceis).

In Theaceis.

Pycnidiosporis 2—3,5 × 1,5—2 μ:

C. theae Petch, Ann. Roy. Bot. Gard. Paradeniya **9**, 324. 1925; in foliis *Camelia theifera* in Ceylonia Insula.

In Crassulaceis.

Pycnidiosporis 5—6 × 3—3,5 μ:

C. sedi Hollós, Math. Termèsz. Közlèm. Magy. Tudom. Akad. **35**, 1 Sz., 18. 1926; in caulibus siccis *Sedi maxini* in Hungaria.

In Saxifragaceis.

A. Pycnidiosporis 3—4 × 2 μ:

C. ribicolum Brun., Act. Soc. Linn. Bordeaux pag. 14 (extr.). 1898; Sacc., Syll. **14**, 923. 1899; in ramis emortuis *Ribis nigri* in Gallia.

AA. Pycnidiosporis (6)7—10 × 3—4,5(6) μ:

C. philadelphi-coronarii (Sacc.), nob., n. comb.; in *Philadelpho coronario* in Italia bor.

= *C. olivaceum* Bon. f. *philadelphi-coronarii* Sacc., Mich. **1**, 205. 1878; Syll. **3**, 305. 1884 [Haec forma sec. Woll. et Hpfl. Z. Parasitenkde **9**, 620. 1937, est contra syn. *C. olivacei* Bon. (v. inAraliaceis)].

Species includendae:

C. ribis Brun., Bull. Soc. Bot. France **36**, 338. 1889; Sacc., Syll. **10**, 263. 1892; Pet. et Syd. in Fedde, Rep. Beih. **42**, 401. 1927; in ramulis siccis *Ribis floridi* in Gallia nec non *R. grossulariae* in Moravia.

≡ *C. grossulariae* P. Henn., Nyt. Magazin for Naturvidensk **42**, 30. 1904; Sacc., Syll. **18**, 303. 1906; ad ramos siccos *Ribis grossulariae* in Norvegia.

≡ *C. olivaceum* var. *ribis-grossulariae* Allesch., Hedw. **34**, 266. 1895.

= *C. fuckelii* Sacc. var. *ribis-aurei* Gz. Frag., Fungi Horti Madrit. pag. 48. 1917; Sacc., Syll. **25**, 247. 1931; in ramulis emortuis *Ribis aurei* in Hispania.

C. saxifragae Rostr., Vidensk. Selskab. Skrift. Kristiania, pag. 8 (extr.). 1906; Sacc., Syll. **22**, 971. 1913; Pet. et Syd. in Fedde, Rep. Beih. **42**, 407. 1927; in foliis siccis *Saxifragae tricuspidatae* in Norvegia.

Observ.:

C. foliorum A. Bondarzew, Mat. Myk. Obsled. Ross., No. 2, pag. 4. 1921; in foliis vivis *Ribis rubri* in Rossia est nobis nondum cognita.

C. melanconieum Sacc., Ann. Myc. **7**, 436. 1909; Syll. **22**, 967. 1913; in ramulis languidis v. emortuis *Ribis grossulariae* in Germania, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 424. 1927, est probabiliter forma quaedam *Coniothyrii ribis*.

Adest autem pro parte in Saxifragaceis: *C. spiraeicola* Gz. Frag. (v. in Rosaceis) in *Ribe aureo* (fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 408. 1927).

A. Pycnidiosporis (3,5)5—6(8) × (2)3—4(5) μ:

C. cystotricha (Schulz.) Sacc. et Trav., Syll. **19**, 398. 1910; Syll. **22**, 969. 1913 ≡ *Sacidium cystotricha* Schulz. v. Mügg. in Verhandl. zool.-bot. Ges. Wien **13**, 254. 1871; in ramis decorticatis emortuis *Cydoniae vulgaris* in Hungaria.

= *C. cydoniae* Brun., Bull. Soc. Sc. Nat. de l'Ouest de la France. Nantes **4**, 35. 1894; Sacc., Syll. **11**, 514. 1895; ad ramulos emortuos *Cydoniae vulgaris* in Gallia [sec. Woll. et Hpfl. in Z. Parasitenkde **9**, 620. 1937 est syn. *Coniothyrium olivacei* Bon. (v. in Araliaceis)].

= *C. cydoniae* Brun. Var. *mali* Horne, Journ. Bot. British and Foreign. **58**, 242. 1920; in Mali fructibus.

= *C. tirolense* Bub., Österr. Bot. Zeitschr. **54**, 183. 1904; Sacc., Syll. **18**, 309. 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 392. 1927; Woll. et Hpfl., Z. Parasitenkde **9**, 629. 1937; in foliis vivis *Piricommunis* in Tirolia (Bubák); in Bulgaria (fide Malkoff, Ann. Myc. **6**, 34. 1908); in foliis vivis *Piri mali* in Serbia (Pet. et Syd.); in fructibus putrescentibus *Pirorum* in Ucraina (Jakovleff: fide Woll. et Hpfl. l. c.); nec non *Piri communis* et *P. mali* in Germania (Woll. et Hpfl.).

Species includendae:

C. wensdorffiae Laub., Arbeit. Biol. Abt. für Land- u. Forstwirtsch. am. Kais. Ges. **4**, 458. 1905; Sacc., Syll. **18**, 303. 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 402. 1927; in ramulis vivis *Rosarum* cult. in Germania.

C. tumefaciens Güssow, Journ. Roy. Hort. Soc. **24**, 229. 1908; Massee, Dis. cult. Plants pag. 417. 1910; Sacc., Syll. **22**, 968. 1913; in caulibus vivis *Rubi fruticosi* in Britannia.

C. spiraeae Miyake, Bot. Mag. Tokyo **28**, 50. 1914; Sacc., Syll. **25**. 244. 1931; in foliis *Spiraeae pubescentis* in Sina.

C. prunicolum (Sacc.) Husz in Bull. R. Hung. Hort. Coll. **5**, 23. 1939; in foliis *Pruni* sp. p. in Hungaria ≡ ? *Depazea prunicola* Opiz; ≡ *Depazea prunicola* Sacc. nom. nudum Myc. ven. 193; ≡ *Phyllosticta prunicola* (Opiz?) Sacc., Mich. **1**, 157. 1878 [fide Pet. et Syd. in Index of Fungi 1936—39 pag. 8. 1950 est etiam *C. prunicolum* (Woll. et Hochpf.) Husz in Bull. R. Hung. Hort. Coll. **5**, 23. 1939 ≡ *Phoma prunicola* Woll. et Hpfl.].

AA. Pycnidiosporis 2,5—3(5) × (1,5)2—2,5(3,5) μ:

C. fuckelii Sacc., Nuovo Giorn. Bot. Ital. **7**, 318. 1875; Syll. **3**, 306. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 403. 1927; in ramis emortuis v. languidis, corticatis *Rubi* in Italia bor. nec non *R. bifrontis, R. suberecti, R. idaei, R. caesii* in Moravia (Pet. et Syd. l. c.).

= *C. fuckelii* Sacc. f. *rubi* Allesch., in Rabh. Krypt. Fl. **7**, 52. 1903; in ramulis siccis *Rubi* in Germania.

= *C. fuckelii* Sacc. f. *rosarum* Sacc., Mich. **1**, 207. 1878 in Italia bor.

= *fuckelii* Sacc. var. *cecidophilum* C. Mass. in Sacc., Ann. Myc. **12**, 283. 1914; Syll. **25**, 247. 1931; in gallis siccis *Diastrophi rubi* ad ramos incrassatos *Rubi caesii* in Italia bor.

Species includendae:

C. pirinum (Sacc.) Sheld. — ubi?; in foliis vivis *Piri mali* in Serbia (fide Ranojevic, Ann. Myc. **8**, 386. 1910; ≡ *C. tirolense* Bubák (fide Ranojevic, Ann. Myc. **12**, 405. 1914); ≡ *Phyllosticta pirina* Sacc., Mich. **1**, 134. 1878; in foliis *Piri communis* nec non in foliis *Piri mali* in Italia bor., Gallia et Lusitania.

C. rosarum Cke. et Harkn., Grevill. **12**, 92. 1884; Sacc., Syll. **3**, 307. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 402. 1927; in ramis *Rosarum* in Amer. bor.

C. comari P. Henn., Hedw. **42**, 220. 1903 (pubbl. pro errore ut *C. comarae*); Sacc., Syll. **18**, 302. 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 357. 1927; in caulibus *Comari palustris* in Germania.

C. convolutum Horne, Journ. of Bot. British. and Foreign. **58**, 242. 1920; in *Mali* fructibus.

AAA. Pycnidiosporis (5)6—10(11) × 5—6(7) μ:

C. microperoides (Schulz.) Sacc. et Trav., Syll. **19**, 400. 1910; Syll. **22**, 969. 1913; in ramis corticatis *Cydoniae vulgaris* in Hungaria; ≡ *Phoma microperoides* Schulz v. Mügg. in Verh. zool. bot. Ges. Wien **13**, 1218. 1871.

Species includendae:

C. cerasi Pass., Bol. Com. Agr. Parmense, Parma pag. 3 (extr.). 1884; Sacc., Syll. **3**, 307. 1884; ad ramulos repente arefactos *Pruni cerasi* in Italia bor.

C. pruni Mc. Alp., Fungus dis. Stone — fr. trees, Melbourne pag. 84. 1902; Sacc., Syll. **18**, 308. 1906; in foliis *Pruni armeniacae* et *P. domesticae* et in fructibus maturis *P. armeniacae* in Australia.

C. armeniacae Hollós, Ann. Mus. Nat. Hung. **4**, 355. 1906; Sacc., Syll. **22**, 968. 1913; in putamine putrescente *Armeniacae vulgaris* in Hungaria.

C. persicae Sacc. et Cub. in Sacc., Ann. Myc. **10**, 318. 1912; Syll. **22**, 968. 1913; in superficie interiore putaminum dejectorum *Persicae vulgaris* in Italia bor.

C. spiraeicola Gz. Frag., Trab. Mus. Nac. Ciaenc. Nat. Madrid, Ser. Bot. no. 12, 49. 1917; Sacc., Syll. **25**, 244. 1931; Pet. et Syd. in Fedde, Rep. Beih. **42**, 408. 1927; in ramulis emortuis *Spi-*

raeae callosae in Hispania nec non in *Ribe aureo* (v. in Saxifragaceis), in Germania (fide Pet.).

Observ.:

Species sequentes excludendae reputamus:

— *C. proteus* (Schulz.) Sacc. et Trav. in Sacc., Syll. **19**, 400. 1910; Syll. **22**, 969. 1913; in ramis corticatis *Cydoniae vulgaris* in Hungaria, propter conidiophororum magnitudinem.

— *C. australe* Sacc., Mich. **1**, 206. 1878; Syll. **3**, 311. 1884 et Syll. **10**, 264. 1892; in ramis emortuis *Mespili germanicae* in Gallia, propter conidiorum magnitudinem.

— *C. phacidioides* Speg., Anal. Soc. Cient. Argentina **13**, 117 (extr.). 1882; Sacc., Syll. **3**, 310. 1884; in sarmentis dejectis putrescentibus *Rubi fruticosi* in Amer. bor., propter conidiophororum magnitudinem.

— *C. fragariae* Oud., Versl. en Med. der Kon. Ak. van Wet. 2, **18**, 37 (extr.). 1883; Sacc., Syll. Add. **1—4**, 323. 1886; Sacc. Syll. **10**, 261. 1892; in receptaculis maturis *Fragariae vescae* in Hollandia, propter conidiorum magnitudinem.

C. piricolum Potebnia, Ann. Myc. **5**, 16. 1907; ut *C. piricola* in Sacc., Syll. **22**, 968. 1913; in foliis vivis *Piri mali* in Rossia est, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 393. 1927, *Leptosphaeria* sp.

C. kerriae Le Bréton, Rev. Myc. **13**, 169. 1891; Syll. **10**, 264. 1892; in ramulis emortuis *Kerriae* in Gallia, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 423. 1927, est species delenda.

C. amygdali Gz. Frag., Trab. Mus. Nac. Cienc. Nat. Madrid ser. Bot. no. 12, 46. 1917; Sacc., Syll. **25**, 244. 1931; in ramulis emortuis *Amygdali persicoidis* in Hispania, sec. Pet. et Syd. l. c. pag. 418, est species dubia.

C. abyssinicum Fl. Tassi, Rev. Myc. **18**, 165. 1896; Sacc., Syll. **14**, 923. 1899; in caulibus emortuis *Brayerae anthelminthicae* in Abyssinia, sec. Pet. et Syd. l. c. pag. 417, est probabiliter *Ascochytella*.

Adest autem pro parte in Rosaceis *C. insitivum* Sacc., in ramulis *Pruni padi* (species exclud. v. in Leguminosis).

In Connaraceis.

Pycnidiosporis 4,5—6(7) × 1,75—2,5 μ (Pet. et Syd.):

C. connari P. Henn., Hedw. **48**, 15. 1908; Sacc., Syll. **25**, 235. 1931; Pet. et Syd. in Fedde, Rep. Beih. **42**, 358. 1927; in foliis vivis *Connari* sp. in Brasilia.

In Leguminosis.

A. Pycnidiosporis 4—7(8) × 2—4 usque 5—6 μ:

C. leguminum (Rabh.) Sacc., Bull. Soc. Roy. Bot. Belg. **31**, parte 2, 233. 1892; Syll. **11**, 514. 1895; Pet. et Syd. in Fedde,

Rep. Beih. **42**, 361. 1927; Woll. et Hpfl., Z. Parasitenkde **9**, 625. 1937; in leguminibus emortuis *Sarothammi scoparii* in Germania ≡ *Sphaeropsis leguminum* Rabh., Fungi europ. no. 1039. 1866 et in Hedw. **6**, 46. 1867.

= *C. sphaerospermum* Fuck., Symb. Myc. pag. 377. 1869; Sacc., Syll. **3**, 308. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 362. 1927; in caulibus siccis *Cytisi sagittalis* in Germania et Helvetia.

= *C. cytisellum* (Pass. et Thüm.) Sacc., Syll. **3**, 308. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 364. 1927; Woll. et Hpfl., Z. Parasitenkde **9**, 625. 1937; ad ramulos aridos *Cytisi albi* in Lusitania. ≡ *Phoma cytisellum* Pass. et Thüm. in Inst. Rev. sc. et litt. Coimbra **28**, 38 (extr.). 1880.

= *C. olivaceum* Bon. var. *sarothamni* Sacc., Syll. **3**, 305. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 362. 1927. In Italia bor.

= *C. laburnicolum* Brun., Act. Soc. Linn. Bordeaux, pag. 14 (extr.). 1898; Sacc., Syll. **14**, 922. 1899; in ramis emortuis *Cytisi laburni* in Gallia.

= *C. laburnophilum* Oud., Contrib. Fl. Myc. Pays-Bas **17**, 257. 1901; Sacc., Syll. **16**, 910. 1902; in Allesch. Rabh. Krypt. Fl. **7**, 919. 1903; Pet. et Syd. in Fedde, Rep. Beih. **42**, 363. 1927 (ut *C. laburniphilum* Oud.); in foliis *Cytisi laburni* in Hollandia nec non *Cytisi ramentacei* in Dalmatia (v. Jaap, Ann. Myc. **14**, 33. 1916).

= *C. scopariicolum* Pet. in Fedde, Rep. Beih. **42**, 361. 1927; in ramulis siccis *Cytisi scoparii* in Moravia = *C. sarothamni* (Thüm.) Sacc., Syll. **3**, 308. 1884; in Allesch. Rabh. Krypt. Fl. **7**, 55. 1903; Pet. et Syd. in Fedde, l. c. pag. 362; Woll. et Hpfl., Z. Parasitenkde **9**, 625. 1937; in ramulis praecipue tenuibus emortuis *Sarothamni scoparii* in Bavaria. ≡ *Phoma sarothamni* Thüm., Myc. Univ. no. 576. 1876.

= *C. genisticola* Oud., Beih. Bot. Centr. **11**, 531, 1902; Sacc., Syll. **18**, 303, 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 368. 1927; in leguminibus *Genistae anglicae* in Hollandia nec non in ramis vivis siccisque et in foliis eiusdem plantae atque *G. tinctoriae*, *G.* spp. in Moravia; in ramis siccis *Cytisi nigricantis* (Pet., Sydowia **6**, 235. 1952) in Austria. ≡ *Phyllosticta coniothyrioides* Sacc., in Pet., Fl. Boh. et Mor. Exsicc. **2**/1, No. 916 (fide Pet. in Sydowia, l. c.). ≡ ? *C. genistae* (Roum.) Berl. et Vogl. in Sacc., Syll. Add. **1—4**, 323. 1886 et Syll. **10**, 264. 1892; in cortice emortuo *Genistae tinctoriae* in Gallia (fide Pet. in Sydowia, l. c.). Sec. Woll. et Hpfl., Z. Parasitenkde. **9**, 628. 1937, *C. genisticola* Oud. et *C. genistae* (Roum.) Berl. et Vogl. sunt, contra, synonima *Coniothyrii insitivi* Sacc. (vide Observ.).

= *C. solenophilum* Maire Boll. Soc. Hist. Nat. Afr. N. **36**, 42. 1945; in leguminibus aridis *Genistae ancistrocarpae* var. *acutiflorae* in Africa bor.

Species includendae:

C. foedans Sacc., Mich **1**, 65. 1877; Syll. **3**, 308. 1884; in ramis corticatis *Robiniae pseudoacaciae* nec non *Mori albae* (Moraceae) et *Quercus* (Juglandaceae) in Gallia, in ramis *Juglandis regiae* (Juglandaceae) in Italia bor.

= *C. fuckelii* Sacc. f. *robiniae — pseudoacaciae* Sacc., Mich. **1**, 207. 1878 in Italia bor.

C. baptisiae (Thüm.) Fl. Tassi, Bull. Orto Bot. Siena pag. 23. 1902; in ramulis emortuis *Baptisiae perfoliatae* in Amer. bor. ≡ *Sphaeropsis baptisiae* Thüm., Flora pag. 177—184. 1878; Sacc., Syll. **3**, 302. 1884.

C. olivaceum Bon. f. *amorphae — fruticosae* Sacc., Mich. **1**, 205. 1878. In Italia bor.

C. olivaceum Bon. f. *sophorae-japonicae* Sacc., Mich **1**, 205. 1878 quae sec. Woll. et Hpfl., Z. Parasitenkde **9**, 620. 1937 est contra syn. *Coniothyrii olivacei* Bon. (v. in Araliaceis).

C. ovalis (Cke. et Harkn.) Fl. Tassi, Bull Orto Bot. Siena pag. 24. 1902; in ramis *Hymeneae* in Amer. bor. ≡ *Sphaeropsis ovalis* Ccke. et Harkn.) Sacc., Syll. **3**, 292. 1884; ≡ *Macroplodia ovalis* Cke. et Harkn., Grev. pag. 82. 1881.

C. punctum Cke. et Harkn., Grev., **12**, 92. 1884; Sacc., Syll. **3**, 309. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 340. 1927; in ramis decorticatis *Acaciae* in Amer. bor. ≡ *C. decipiens* Cke. et Harkn., Grev. **12**, 92. 1884.

C. fuscidulum Sacc. f. *galegae* Sacc., Syll. **3**, 307. 1884, in Gallia.

C. cassiaecolum Cke., Grev. **13**, 96. 1885; Sacc., Syll. Add. **1—4**, 323. 1886; Syll. **10**, 264. 1892; Pet. et Syd. in Fedde, Rep. Beih. **42**, 352. 1927; in caulibus *Cassiae marylandicae* in Britannia.

C. rostrupii (Berl. et Vogl.) Fl. Tassi, Bull. Orto Bot. Siena pag. 25. 1902; in radicibus *Trifolii hybridi* in Islandia ≡ *Sphaeropsis rostrupii* Berl. et Vogl. in Sacc., Syll. Add. **1—4**, 439. 1886; Syll. **10**, 251. 1892.

C. siliquastri Brun., Bull. Soc. Sc. Nat. de l'Ouest de la France, Nantes **4**, 35. 1894; Sacc., Syll. **11**, 514. 1895; ad ramos emortuos *Cercidis siliquastri* in Gallia.

C. ononidis (Allesch.) Pet. (non Pat.) apud Pet. et Syd. in Fedde, Rep. Beih. **42**, 384. 1927; in caulibus siccis *Ononidis spinosae* in Bohemia et *O.* sp. in Italia bor. ≡ *C. olivaceum* Bon. var. *ononidis* Allesch. in Berichte Bayer. Bot. Ges. **5**, 18. 1897.

C. ononidis Pat. [non (Allesch.) Pet.], Cat. rais. pl. cell. Tunisie pag. 119. 1897; Sacc., Syll. **14**, 923. 1899; in caulibus et siccis *Ononidis* in Africa bor.

C. lespedezae (P. Henn.) Died., Krypt. Fl. Mark Brandenburg **9**, 571. 1914; Pet. et Syd. l. c. pag. 378; in caulibus siccis *Lespedezae tricoloris* in Germania ≡ *Sphaeropsis lespedezae* P. Henn., Notizbl. Bot. Gart. u. Mus. Berlin no. 22 pag. 39. 1900.

C. pycnanthae Mc.Alp., Proc. Linn. Soc. New. S. Wal. pag. 121. 1904; Sacc., Syll **18**, 303. 1906; in phyllodiis *Acaciae pycnanthae* in Australia.

C. lathyri Potebnia, Ann. Myc. **5**, 16. 1907; Sacc., Syll. **22**, 969. 1913 in stipulis *Lathyri pisiformis* in Rossia.

C. olivaceum Bon. var. *gymnocladi* Hollós, Növényt. Közlemén. **6**, 6 (extr.). 1907; Sacc., Syll. **22**, 969. 1913; in ramis siccis dejectis *Gymnocladi canadensis* in Hungaria.

C. fructicola Hollós, l. c.; Sacc., Syll. **22**, 970. 1913; in fructibus dejectis *Gymnocladi canadensis* in Hungaria.

C. kraunhiae Miyake, Bot. Mag. Tokyo **26**, 59. 1912; Sacc., Syll. **25**, 239. 1931; in foliis *Wistariae (Kraunhiae) floribundae* in Sina.

C. adenocarpi (Gz. Frag.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 342. 1927; in ramis siccis *Adenocarpi commutati* in Hispania ≡ *C. concentricum* (Desm.) Sacc. var. *adenocarpi* Gz. Frag., Rev. R. Acad. Cience. Ex., Fis. y Nat. de Madrid **15**, 694. 1917.

C. dorycnii Jordan de Urries y Azara, An. Jard. Bot. Madr. **2**, 162. 1941; in ramulis *Dorycnii subfruticosi* in Hispania.

C. sojae Bouriquet, Les maladies des plantes cult à Madagascar pag. 351. 1947, in caulibus *Sojae* in insula Madagascar.

C. gelatosporum Pet., Sydowia **8**, 211. 1954; in *Gompholobio huegelio* in Australia.

AA. Pycnidiosporis 3,7—7 (8) × 1.5—2(2.5) μ:

C. ucrainicum Pet. in Fedde, Rep. Beih. **42**, 346. 1927; in ramis siccis *Astragali glycyphylli* in Galitia et Moravia.

= *C. astragalinum* Kirschst., Ann. Myc. **37**, 138. 1939 in *Astragalo glycyphyllo* in Germania.

= *C. phomoides* Kirschst. [non (Crouan) Sacc. v. in Apocynaceis], Hedw. **81**, 207. 1944; in ramis siccis *Astragali glycyphylli* in Germania (Pet., Sydowia **1**, 64. 1947, adfirmat esse certe nihil aliud nisi *C. astragalinum* Kirschst. et *C. ucrainicum* Pet.).

AAA. Pycnidiosporis 5—8(9.5) × 4.5—7.5 μ:

C. acaciae Trott., Nuovo Giorn. Bot. Ital. pag. 21. 1916; Sacc., Syll. **25**, 238. 1931; in ramis *Acaciae tortilis* in Africa bor.

Species includenda:

C. asperulum Pet., Sydowia **1**, 136. 1947; in ramulis emortuis *Coronillae emeri* in Austria.

Observ.:

Descriptionem reperire non potuimus huius speciei: *C. baeticum* Picbauer, Sbornik Vysok. Škol. Zeměděslsk. v Brně Sign, D. **18**, 25. 1931; ad caules emortuos *Astragali baetici* cult. in Moravia.

C. retamae (Gz. Frag.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 397. 1927; in ramulis siccis *Retamae sphaerocarpae* in Hispania ≡ *C. olivaceum* Bon. f. *retamae* Gz. Frag, Rev. R. Acad. Cienc. Ex. Fis. y Nat. Madrid **15**, 696. 1917; sec. Pet. et Syd. l. c. incerta species est quamvis posita, ad interim in specibus validis, ut etiam *C. rafniicola* (P. Henn.) Pet., l. c. pag. 396, in fructibus siccis *Rafniae* in Africa austr. quod probabiliter sec. Pet. l. c. est *Microdiplodia* cum conidiis unicellularibus.

C. subolivaceum Sacc., Syll. **3**, 316. 1884; in caulibus *Lupini* in Germania ≡ *Clisosporium olivaceum* Bon., Abhandl. Geb. Myc. **1**, 140. 1864, est species dubia propter description sine conidiorum dimensionibus.

C. trifolii Naoumow, Bull. Angew. Bot. St. Petersburg **6**, 205. 1913; Sacc., Syll. **25**, 239. 1931; in caulibus vivis *Trifolii pratensis* in Rossia, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 431. 1927, est species dubia.

C. sublineatum Sacc. et Malbr., Mich. **2**, 624. 1882; Sacc., Syll. **3**, 308. 1884; in ramulis emortuis *Sarothamni scoparii* in Gallia est sec. Pet. et Syd. l. c. pag. 362. probabiliter *Microdiplodia* aut *Ascochytella.*

C. rude Bubàk, Ann. Naturhist. Mus. Wien **28**, 210. 1914; Sacc., Syll. **25**, 238. 1931; in rachidibus emortuis *Astragali spinosi* et *Ammothamni gibbosi* in Mesopotamia nec non (v. Pet., Ann. Naturhist. Mus. Wien **52**, 376. 1941 publ. 1942) in pedunculis siccis foliorum *Astragali psilodontis* et *A. bethlemitici* in Syria et in ramis siccis *Capparidis spinosae* in Mesopotamia, *A. brevidentis* in Turkestania (Rossia) est sec. Pet. et Syd., Ann. Myc. **22**, 329. 1924, in Fedde, Rep. Beih. **42**, 429. 1927 et in Sydowia **3**, 315. 1949, *Ascochytella rudis* (Bub.) Pet. et Syd., Ann. Myc. l. c.

C. laburni Richon, Cat. Champ. no. 1645 (absque diagnosi); Sacc., Syll. **10**, 264. 1892; in ramis decorticatis *Cytisi laburni* in Gallia est species excludenda v. delenda (nomen nudum).

C. leguminicola Jaap, Ann. Myc. **14**, 33. 1916; Sacc., Syll. **25**, 239. 1931; in leguminibus praeteriti anni adhuc pendulis *Calycotomes infestae* in Dalmatia, est sec. Pet. et Syd. in Ann. Myc. **23**, 30. 1925 et in Fedde, Rep. Beih. **42**, 423. 1927 *Ascochytella leguminicola* Pet., Ann. Myc. l. c.

C. leguminis Sacc., Mich. **2**, 105. 1880; in leguminibus dejectis *Robiniae pseudoacaciae* in Gallia, est sec. Pet. et Syd. in Fedde, l. c.

pag. 514. species excludenda; sec. Woll. et Hpfl., Z. Parasitenkde **9**, 625. 1937 est contra syn. *Coniothyrii leguminum* (Rabh.) Sacc.

C. leguminis Sacc. f. *cytisi* in Herb. (Mus. Bot. Berol.) in leguminibus siccis pendulis *Cytisi laburni* in Suecia. 1914, est exclud. v. delenda (nomen nudum); sec. Woll. et Hpfl., l. c., pag. 625, est syn. *Coniothyrii leguminum* (Rabh.) Sacc.

C. sarothamni (Thüm.) Sacc. v. *leguminum* Nietschke in Herb. cf. Rabh., Fungi europ. 1039 est exclud. v. delenda (nomen nudum); sec. Woll. et Hpfl., l. c. pag. 625, est syn. *Coniothyrii leguminum* (Rabh.) Sacc.

C. halimodendri Murashk., Trudy Sibir. Selsk. chos. Akad. Omsk, pag. 124. 1924; in ramis vivis *Halimodendri argentei* in Sibiria, est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 422. 1927, species excludenda.

C. hortense Sacc. et Malbr., Mich. **2**, 624. 1882; Sacc., Syll. **3**, 315. 1884; in caulibus emortuis *Pisorum* in Gallia, est sec. Pet. et Syd. in Ann. Myc. **23**, 240. 1925 et in Fedde, Rep. Beih. **42**, 423. 1927 species delenda.

C. globuliferum Rabh., Hedw. **17**, 60. 1878; Sacc., Syll. **3**, 308. 1884; in foliis *Bauhiniae vahlii* in India orient., est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 303. 1927 syn. *Lasmaniellae globuliferae* (Rabh.) Pet. et Syd. l. c.

C. cytisi P. Henn., Nyt. Mag. for Naturvidensk. **42**, 30. 1904; Sacc., Syll. **18**, 303. 1906; in ramis emortuis *Cytisi nigricantis* in Norvegia, est sec. Pet. et Syd. l. c. pag. 420 "*Coniothyrium* quodvis *Cytisi*".

C. saccardianum (Speg.) Fl. Tassi, Bull. Orto Bot. Siena pag. 25, 1902 ≡ *Sphaeropsis saccardiana* (Speg.) Sacc., Syll. **3**, 292. 1884 ≡ *Diplodia saccardiana* Speg., Nov. Add. no. 168 et Mich. **2**, 270. 1881; in ramulis *Sarothamni scorparii* in Italia bor., est certe *C. saccardiana* (Speg.) Allesch., in Rabh. Krypt. Fl. **7**, 55. 1903 cum iisdem synonimis et eadem matrice in eodem loco, quod ut *C. saccardianum* (Speg.) Allesch., Pet. et Syd. (in Fedde, Rep. Beih. **42**, 362. 1927) esse verisimiliter formam immaturam *Camarosporii alpini* (Speg.) Sacc. adfirmaverunt.

C. insitivum Sacc., Mich. **1**, 206. 1878; Syll. **3**, 306. 1884; in ramulis *Gleditschiae, Albizziae* in Italia bor. et Gallia, in ramis siccis *Gleditschiae triacanthi* in Serbia (Ranojevic, Ann. Myc. **8**, 386. 1910) et *Robiniae pseudoacaciae* (Pet., Ann. Myc. **25**, 31. 1925) et in coeteris plantis (v. in Berberidaceis, Rhamnaceis, Ulmaceis, Simarubaceis, Oleaceis, Rosaceis, Aceraceis), sec. Died., Ann. Myc. **11**, 44. 1913, transferendum est ad *Haplosporellam* (*Haplosporella rhamni* Died. = *C. insitivum* Sacc. pro parte ?); sec. Sacc., Ann. Myc. **12**, 299. 1914, est syn. *Haplosporellae insitivae* Sacc., in ramis corticatis emortuis *Coluteae arborescentis* in Britannia; sec. Pet., Ann. Myc. **21**,

7. 1923, est species typus generis *Coniothyriopsis* : *Coniothyriopsis insitiva* (Sacc.) Pet. sed sub hoc nomine Pet. comprehendit solum illam formam in *Valsaria insitiva* parasiticam; sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 451. 1927, est syn. *Cytopleae insitivae* (Sacc.) Pet.; sec. Woll. et Hpfl., Z. Parasitenkde **9**, 628. 1937, est species valida cum synonimis sequentibus: ≡ *Cytoplea insitiva* (Sacc.) Pet. in Pet. et Syd., in Fedde, Rep. Beih. **42**, 451. 1927; ≡ *Haplosporella insitiva* Sacc., Ann. Myc. **12**, 299. 1914; ≡ *Coniothyrium genisticola* Oud., Beih. Bot. Zbl. **11**, 531. 1902; Sacc., Syll. **10**, 264. 1892; ≡ *C. genistae* (Roum.) Berl. et Vogl. in Sacc., Syll. Add. **1—4**, 323. 1886 et Syll. **10**, 264. 1892; ≡ *Septoria genistae* Roum., Rev. Myc. pag. 230. 1884.

Adsunt autem pro parte in Leguminosis:

— *C. instrustans* Sacc., in ramis corticatis *Albizziae julibrissin* in Italia bor. (species excl. v. in Moraceis).

— *C. olivaceum* Bon. (v. in Araliaceis), in *Wistaria* (fide Sacc., Syll. **3**, 305. 1884; Woll. et Hpfl., Z. Parasitenkde **9**, 620. 1937), in *Sophora japonica* (fide Woll. et Hpfl. l. c.), in ramis siccis *Acaciae* sp. in Italia bor. (fide Pet., Ann. Myc. **20**, 136. 1922).

— *C. fuckelii* Sacc. (v. in Rosaceis), in ramis emortuis v. languidis corticatis *Robiniae* in Europa, in caulibus aridis *Ononidis spinosae* in Moravia (fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 385. 1927).

— *C. olivaceum* Bon. f. *hispanica* Gz. Frag., Trab. Mus. Nac. Cienc. Nat. Madrid ser. Bot. no. 5, pag. 16. 1914; Sacc., Syll. **25**, 248. 1931; (v. in Caprifoliaceis) in caulibus ramisque siccis *Adenocarpi hispanicae* in Hispania. Haec forma sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 426. 1927, est excludenda.

In Elaeagnaceis.

C. montagnei Cast., Ann. Sc. Nat. 3, **12**, 304. 1849; Sacc., Syll. **3**, 310. 1884; Syll. **10**, 262. 1892; in ramulis emortuis *Elaeagni angustifolii* inque caulibus pedunculis fructibusque *Bupleuri fruticosi* (Umbelliferae) in Gallia nec non (fide Pet., Sydowia **7**, 33. 1953) in *Elaeagno hortense* in Asia minore, est species dubia (v. Pet. et Syd. in Fedde, Rep. Beih. **42**, 424. 1927); sec. Potebnia, Ann. Myc. **5**, 16. 1907, est probabiliter *Hasplosporella.*

In Onograceis.

Pycnidiosporis 3—5 × 2—2,8 μ (Pet. et Syd.):

C. epilobii Ferraris, Malpighia **16**, 25. 1902; Sacc., Syll. **18**, 304. 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 364. 1927; in ramulis corticatis emortuis *Epilobii dodonaei* in Italia bor. nec non *E. angustifolii* in Germania.

Observ.:

C. boydeanum A. L. Smith, Journ. Roy. Microsc. Soc. pag. 423. 1900; Sacc., Syll. **16**, 910. 1902; in ramis emortuis *Fuchsiae* in Britannia, est praecipue propter conidiorum et sporophororum magnitudinem species excludenda.

Adest autem probabiliter in Onagraceis pro parte: *C. fuckelii* Sacc., Nuovo Giorn. Bot. Ital. **7**, 318. 1875 (v. in Rosaceis); in caulibus (*Epilobium* ?) Amer. bor. (fide Lewis, Sydowia **6**, 434. 1952).

In Lythraceis.

A. Pycnidiosporis 2,5—4(5) × 2—3 µ:

C. hyssopifolii Oud., Nederl. Kruidk. Arch. 3, **1**, 66. 1898; Sacc., Syll. **16**, 909. 1902; Pet. et Syd. in Fedde, Rep. Beih. **42**, 379. 1927; ad caules *Lythri hyssopifolii* in Hollandia.

AA. Pycnidiosporis 7—8 × 5—6 µ:

C. peplis A. L. Smith et J. Ramsbottom, Trans. Brit. Myc. Soc. **4**, 326. 1913 (1914); Sacc., Syll. **25**, 241. 1931; in foliis caulibusque vivis *Peplis portulae* in Britannia.

In Myrtaceis.

Pycnidiosporis 5—7,5 (raro usque 8) × 5—7,5 µ:

C. callistum Syd., Ann. Myc. **35**, 358. 1937; in foliis *Eucalypti hemastomae* in Australia.

Species includenda:

C. globulosum Da Camara, Agron. Lusit. **10**, 305. 1948; in foliis *Eucalypti globuli* in Lusitania.

Observ.:

C. eugeniae Fl. Tassi, Bull. Lab. Orto Bot. Siena pag. 18. 1900; Sacc., Syll. **16**, 910. 1902; in foliis putrescentibus *Eugeniae jambos* in Italia centr., est propter conidiorum et sporophorum magnitudinem species excludenda.

C. eucalypti Gz. Frag., Bol. Soc. Brot. 2, **2**, 59 (extr.). 1923; in foliis siccis *Eucalypti globuli* in Lusitania est, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 305. 1927, probabiliter *Lasmeniella eucalypti* (Gz. Frag.) Pet. et Syd. Idem esse reputamus cum *C. olivaceo* Bon. var. *eucalypti* Gz. Frag., Bol. Soc. Brot. 2, **2**, 59 (extr.). 1923.

C. leprosum Fairm., Flora of Santa Catalina Island, Chicago pag. 328. 1923; in *Eucalypto* sp. cult. in Amer. bor., sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 481. 1927 est *Fairmaniella leprosa* (Fairm.) Pet. et Syd. l. c.

C. trigonosporum Rangel, Arch. Mus. Nac. Rio Jan. **7**, 162. 1917 (ut *C. trigonicolum*); in foliis vivis *Eugeniae uniflorae* in Amer. austr., est, propter sporophororum magnitudinem, species excludenda.

Adest autem in Myrtaceis pro parte: *C. fuckelii* Sacc., Nuovo Giorn. Bot. Ital. **7**, 318. 1875 (v. in Rosaceis); ad truncum *Eucalypti globuli* in Lusitania (fide Gz. Frag., Bol. Soc. Brot. 2, **2**, 59. 1924).

In Punicaceis.

C. iranicum Esf., Sydowia **1**, 163. 1947 in cortice ramulorum *Punicae granati* in Iran, est, propter conidiorum magnitudinem et propter stroma, species excludenda.

In Malvaceis.

C. hibisci (Berk.) Fl. Tassi, Bull. Orto Bot. Siena pag. 24. 1902 ≡ *Sphaeropsis hibisci* (Berk.) Cke., Grev. **20**, 106. 1891; Sacc., Syll. **11**, 512. 1895 ≡ *Sphaeria* (sine nomine specifico) Berk. in Herb. no. 35 (nomen nudum); in cortice *Hibisci syriaci* in Amer. bor., est species excludenda propter conidiorum magnitudinem.

In Bombacaceis.

Pycnidiosporis 3—5 × 1,5—2 μ:

C. ceibae Pet. et Cif., Ann. Myc. **30**, 276. 1932; in foliis vivis *Ceibae pentandrae* cult. in Amer. centr.

In Tiliaceis.

Pycnidiosporis 4—6 × 2,5—3,5 μ:

C. tiliae Miyake, Bot. Mag. Tokyo **28**, 50. 1914; Sacc., Syll. **25**, 246. 1931; in foliis *Tiliae cordatae* in Sina.

Observ.:

C. subradicale Karst., Hedw. **23**, 18. 1884; Sacc., Syll. **3**, 311. 1884; in radice denudata *Tiliae ulmifoliae* in Fennia ≡ *Haplosporella subradicalis* Allesch. in Rabh. Krypt. Fl. Deutschl. **7**, 73. 1901, est, sec. Pet. et Syd., Ann. Myc. **22**, 318. 1924, *Dichomera tiliae* (Therry) Sacc.

C. australe Sacc., Mich. **1**, 206. 1878 var. *β tiliae* Sacc., Mich. **2**, 624. 1882; Syll. **3**, 311. 1884, est, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 514. 1927, *Dichomera tiliae* (Therry) Sacc.

In Sterculiaceis.

Pycnidiosporis 4—5,5 × 2—2,5 μ (Pet. et Syd.):

C. herraniae P. Henn., Hedwigia **48**, 111. 1908; Sacc., Syll. **25**, 245. 1931; Pet. et Syd. in Fedde, Rep. Beih. **42**, 373. 1927; in foliis vivis *Herraniae paraënsis* in Amer. austr.

In Linaceis.

Pycnidiosporis 6—11 × 4,5—6,5 μ:

C. aegeum Pet., Ann. Naturh. Mus. Wien **52**, 373. 1941; in caulibus emortuis *Lini arborei* in Graecia.

Observ.:

Adest autem in Linaceis pro parte: *C. olivaceum* Bon. (v. in Araliaceis); in ramulis caulibus rarius foliorum *Lini usitatissimi* in

Europa et Amer. austr., fide Woll. et Hpfl., Z. Parasitenkde **9**, 621. 1937.

In Geraniaceis.

Pycnidiosporis 5 × 3,6 µ:

C. pelargonii (Massa) nob., n. comb.; in foliis languidis *Pelargonii* (sp. cult.) in Italia bor.

= *C. olivaceum* Bon. f. *pelargonii* Massa in Ferraris et Massa, Ann. Myc. **10**, 289. 1912; Sacc., Syll. **25**, 248. 1931.

Observ.:

C. trabutii A. Riza, Bull. Soc. Myc. France **28**, 150. 1912; Sacc., Syll. **25**, 237. 1931, ad folia viva *Pelargonii peltati* in Africa bor. et in Lusitania (fide Da Camara, Agron. Lusit. **10**, 305. 1948) est, praecipue propter conidiorum magnitudinem, species excludenda.

In Zygophyllaceis.

C. nitrariae Bubàk, Ann. Naturhist. Mus. Wien **28**, 210. 1914; Sacc., Syll. **25**, 246. 1931; in cortice *Nitrariae retusae* ad confines Mesopotamiae et Arabiae bor., sec. Pet. et Syd. in Ann. Myc. **22**, 330. 1924 et in Fedde, Rep. Beih. **42**, 426. 1927, est *Ascochytella.*

C. zygophylli Syd., Monit. Jard. Bot. Tiflis **26**, 6. 1913 et Ann. Myc. **11**, 63. 1913; Sacc., Syll. **25**, 246. 1931; in caulibus siccis *Zygophylli fabaginis* in Caucaso, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 431. 1927, est *Ascochytella zygophylli* Syd. (v. etiam Ann. Myc. **22**, 320. 1924).

In Rutaceis.

A. Pycnidiosporis pariete crassa, majoribus, sphaeroideis:

C. pax-augustanum Urríes y Azara, An. Jard. Bot. Madr. **5**, 142. 1945; in epicarpio *Citri aurantii* in Hispania.

AA. Pycnidiosporis pariete delicata, minoribus, elongatis . . . . B

B. Pycnidiosporis majoribus (3) plerumque 4—8 × (2)3—5 µ:

C. fusco-atrum Penz. in Sacc., Mich. **2**, 440. 1882; Syll. **3**, 311. 1884; in ramulis siccis *Citri aurantii* in frigidariis in Italia bor.

= *C. olivaceum* Bon. f. *hesperidum* Penz., Mich. **2**, 441. 1882; Sacc. Syll. **3**, 305. 1884; in ramulis emortuis, rarius in foliorum maculis aridis *Citrorum* et *"Limoniae australis"* in Italia bor.

= *C. cervinum* Mc. Alp., Agric. Dept. Victoria, Melbourne pag. 97. 1899; Sacc., Syll. **16**, 909. 1902; in foliis *Citri limoni* in Australia.

Species includendae:

C. rutae P. Henn., Hedw. **42**, 220. 1903; Sacc., Syll. **18**, 304. 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 404. 1927; in caulibus siccis *Rutae graveolentis* in Germania.

C. olivaceum Bon. var. *pteleae* Hollòs, Növényt. Közlemén. **6**, 6 (extr.) 1907; Sacc., Syll. **22**, 969. 1913.

BB. Pycnidiosporis minoribus 2,5—3,5 × 1,5—2,5 μ:

C. paulense P. Henn., Hedw. **48**, 15. 1908; Sacc., Syll. **25**, 245. 1931; Pet. et Syd. in Fedde, Rep. Beih. **42**, 355. 1927; in foliis vivis *Citri* sp. in Amer. austr.

Observ.:

C. henriquesii (Thüm.) Fl. Tassi, Bull. Lab. Orto Bot. Siena **5**, 24. 1902 (non Thüm. v. in Liliaceis); in ramulis emortuis *Citri aurantii* in Lusitania est, sec. Pet. et Syd. l. c. pag. 110, *Sphaeropsis henriquesii* Thüm.

Adest autem in Rutaceis pro parte: *C. fuckelii* Sacc. (v. in Rosaceis) in foliis *Citrorum* arescentibus (fide Sacc., Syll. **3**, 306. 1884), nec non in ramulis *Citri tripterae* in Lusitania (fide da Camara, Bol. Agric. Lisboa **2**, 41. 1936).

In Simarubaceis.

Pycnidiosporis 7—8 × 3,5—4,5 μ:

C. ailanthi-glandulosae (Sacc.) nob., n. comb., in *Ailantho glandulosa* in Italia bor.

= *C. olivaceum* Bon. f. *ailanthi-glandulosae* Sacc., Mich. **1**, 205. 1878; Syll. **3**, 305. 1884.

Observ.:

Adest autem pro parte in Simarubaceis: *C. insitivum* Sacc., in ramulis *Ailanthi glandulosi* (species exclud. v. in Leguminosis).

In Polygalaceis.

Pycnidiosporis 7—12 × 5—6 μ vel 5—6 μ diam.:

C. hualaniae (Speg.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 374. 1927; in ramis emortuis *Hualaniae colletioides* in Amer. austr.
= *Coniothyriopsis hualaniae* Speg., An. Mus. Nac. Buenos Aires **20**, 361. 1910.

In Vochysiaceis.

C. vochysiae P. Henn., Hedw. **44**, 7. 1905; Sacc., Syll. **18**, 309. 1906; in foliis coriaceis *Vochysiae* sp. in Amer. austr., sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 311. 1927, est, syn. *Lasmaniellae vochysiae* (P. Henn.) Pet. et Syd.

In Anacardiaceis.

Pycnidiosporis 5—10 × 3—6 μ:

C. rhois-radicantis (Sacc.) nob., n. comb.; in planta eiusdem nominis in Italia bor.

= *C. olivaceum* Bon. f. *rhois-radicantis* Sacc., Mich. **1**, 205. 1878; Syll. **3**, 305. 1884 (fide Woll. et Hpfl., Z. Parasitenkde **9**, 620. 1937, pro syn. *C. olivacei* Bon.).

= *C. rhois* Tharp, Mycol. **9**, 116. 1917; Sacc., Syll. **25**, 232. 1931; in foliis vivis *Rhois virentis* in Amer. bor.

Observ.:

Adest autem pro parte in Anacardiaceis: *C. incrustans* Sacc., Atti Soc. Venet.-Trent. Sc. Nat. **4**, 114. 1875; in *Rhoe typhina* in Italia bor., sed sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 449. 1927, est, species excludenda.

In Aceraceis.

A. Pycnidiosporis 6—7 × 3,5 μ:

C. ferrarisianum nob., n. nom.; in ramulis siccis *Aceris pseudoplatani* in Italia bor.

= *C. olivaceum* Bon. var. *aceris* Ferraris, Malpighia **16**, 24. 1902; Sacc., Syll. **18**, 304. 1906.

AA. Pycnidiosporis 2,2—4,4 μ diam.:

C. negundinis Tehon et Daniels, Mycol. **17**, 243. 1925; in *Acero negundine* in Amer. bor. (fide Woll. et Hpfl., Z. Parasitenkde **9**, 614. 1937, est syn. *Coniothyrii fuckelii* Sacc., v. in Rosaceis).

Observ.:

Huius speciei diagnosin reperire non potuimus: *C. aceris* A. Bond., Mat. Myk. Obsled. Ross., No. 2, pag. 4. 1921; in foliis *Aceris platanoidis* in Rossia.

In Hippocastanaceis.

Adest pro parte in Hippocastanaceis: *C. insitivum* Sacc., in ramulis siccis *Aesculi hippocastani*, fide Pet., Ann. Myc. **25**, 31. 1925 (species excludenda v. in Leguminosis).

In Sapindaceis.

Pycnidiosporis 6—8 × 3—4 μ:

C. koelreuteriae (Hollós) nob., n. comb.

= *C. olivaceum* Bon. var. *koelreuteriae* Hollós, Növenyt. Közlemén. **6**, 6 (extr.). 1916; Sacc., Syll. **22**, 969. 1913; in ramis siccis *Koelreuteriae paniculatae* in Hungaria.

In Aquifoliaceis.

A. Pycnidiosporis 2,5—5 × 2—3 μ:

C. ilicinum Ell. et Anders., Bot. Gaz. pag. 46. 1891; Sacc., Syll. **10**, 264. 1892; in foliis *Ilicis* sp. in Amer. bor.

Species includenda: .

C. ilicis A. L. Smith et Ramsb., Trans. Brit. Myc. Soc. **5**, 426. 1917; Sacc., Syll. **25**, 232. 1931; in foliis languidis *Ilicis aquifolii* in Britannia.

AA. Pycnidiosporis maioribus 4—8 × 2,5—4 μ:

C. yerbae Speg., An. Mus. Nac. Buenos Aires **17**, 135 (extr.). 1908; Sacc., Syll. **22**, 970. 1913; ad ramulos languidos v. arescentes *Ilicis paraguariensis* in Amer. austr.

= *C. maticola* Speg., l. c. pag. 135; Sacc. l. c. pag. 970; ad ramulos languidos *Ilicis paraguariensis* in Amer. austr.

= *C. mate* Speg., l. c. pag. 135; Sacc., l. c. pag. 971; ad truncos cariosos *Ilicis paraguariensis* in Amer. austr.

In Celastraceis.

Pycnidiosporis 4,5—7 × 3—5 μ:

C. evonymi-japonicae (Sacc.) nob., n. comb.

= *C. olivaceum* Bon. f. *evonymi-japonici* Sacc., Mich. 1, 205. 1878; Syll. **3**, 305. 1884; Woll. et Hpfl., Z. Parasitenkde **9**, 621. 1937; in planta eiusdem nominis in Germania.

In Staphyleaceis:

Pycnidiosporis 3—4 × 2—2,5 μ vel 2,5—3 μ diam.:

C. staphyleae Peck, N. Y. State Mus. Rept. **39**, 46. 1886; Sacc., Syll. **10**, 263. 1892; Pet. et Syd. in Fedde, Rep. Beih. **42**, 408. 1927; in ramis dealbatis *Staphyleae trifoliae* in Amer. bor. (seç. Woll. et Hpfl., Z. Parasitenkde **9**, 613. 1937 est, syn. *Coniothyrii fuckelii* Sacc. v. in Rosaceis).

In Rhamnaceis.

A. Pycnidiis cum stromate basali:

C. jaapianum Petr. et Syd. in Fedde, Rep. Beih. **42**, 399. 1927; in ramis siccis *Rhamni catarthici* in Germania, Austria et in Moravia (legit Pet., Fl. Boh. et Mor. exs. II/1, no. 1061 ut *Dothiorella stromatica* (Preuss.) Sacc.); ≡ *Haplosporella rhamni* Died., Krypt. Fl. Mark Brandenburg **9**, 588. 1914; ≡ *Sclerothyrium rahmni* v. Höhn., Hedw. **60**, 146. 1918.

In hac distributione probabiliter est includendum *C. olivaceum* Bon. f. *paliuri-aculeati* Sacc., Mich. **1**, 205. 1878, propter "perithecia caespitulosa" et si ita sunt ad indicandum stroma basale, propter prioritatem haec forma appellanda est: **C. paliuri-aculeati** (Sacc.) nob., n. comb. et comprehendit *C. jaapianum* Pet. et Syd.

AA. Pycnidiis sine stromate basali, pycnidiosporis 5—7 × 2,5—5 μ:

C. rhamni (West.) Keissler, Beih. Bot. Zbl. **38**, 426. 1921; Pet. et Syd. in Fedde, Rep. Beih. **42**, 399. 1927; in foliis *Rhamni frangulae* nec non *R. catharticae*, *R.* sp. et *Alaterni* in Italia, Gallia, Lusitania, Belgio, Bohemia et Moravia;

≡ *Phyllosticta rhamni* West., Not. **5**, 26. 1863; Sacc., Syll. **3**, 14. 1884;

= *C. rhamnigenum* (Sacc.), Bub., Hedw. **47**, 361. 1908; Sacc., Syll. **22**, 971. 1913; Pet. et Syd. in Fedde, l. c. pag. 398.

≡ *Phyllosticta rhamnigena* Sacc., Mich. **1**, 156. 1878.

≡ *Phyllostictella rhamnigena* Fl. Tassi, Bull. Lab. Orto Bot. Siena **4**, 5. 1901.

= *C. dumeei* Briosi et Cav., Funghi parass. piante colt. od ut. no. 392. 1905; Sacc., Syll. **22**, 971. 1913; Pet. ed Syd. in Fedde, l. c. pag. 399; in foliis vivis *Rhamni frangulae* in Gallia, quod fide Keissler in Beih. Bot. Zbl. **38**, 426. 1921 est idem cum *C. rhamnigeno* (Sacc.) Bub.

= *C. rhamni* Miyake, Bot. Mag. Tokyo **27**, 49. 1913; Sacc., Syll. **25**, 243. 1931; in foliis *Rhamni* sp. in Sina.

Species includendae:

C. paliuri (Brun.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 512. 1927; in foliis vivis *Paliuri australis* et *P. aculeati* in Italia bor. ≡ *Phyllosticta paliuri* Brun., Journ. Hist. Nat. Bordeaux, et Sud-Ouest, pag. 2 (extr.). 1887; ≡ *Phyllosticta camusiana* Sacc., Atti Soc. Nat. Mod. pag. 109. 1888; ≡ *C. tremniacense* Sacc. in Mad. Ver. pag. 15 (extr.). 1918; Syll. **25**, 243. 1913.

C. fuckelii Sacc. f. *zizyphi* Sacc., Ann. Myc. **11**, 317. 1913; in ramis emortuis *Zizyphi* vulgaris in Japonia.

Observ.:

C. australe Sacc., Mich. **1**, 206. 1878; Syll. **3**, 311. 1884; in ramulis *Paliuri aculeati* in Italia bor. est, praecipue propter conidiorum magnitudinem, species excludenda.

C. subcrustaceum Bub., Ann. Naturh. Mus. Wien **28**, 211. 1914; Sacc., Syll. **25**, 244. 1931 est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 430. 1927, probabiliter *Ascochytella* cum conidiis unicellularibus.

Adsunt autem pro parte in *Rhamnaceis: C. olivaceum* Bon. (v. in Araliaceis) in fructibus siccis *Paliuri spina-christi* in Dalmatia fide Jaap, Ann. Myc. **14**, 33. 1916; *C. insitivum* Sacc. (species exclud. v. in Leguminosis) in ramis *Rhamni catharticae* et *R. frangulae;* et *C. vacciniicolum* (Schw.) Starb. (v. in Ericaceis) in ramulis *Ceanothi* in Amer. bor.

In Vitaceis.

Pycnidiosporis 3,5—5 × 2—3 μ:

C. ampelopsidis-hederaceae (Sacc.) nob., n. comb.; in *Ampelopside hederacea* in Italia bor.

= *C. fuckelii* Sacc. f. *amphelopsidis-hederaceae* Sacc., Mich. **1**, 207. 1878.

Species includenda:

C. vitis Delacr., Bull. Soc. Myc. **6**, 141. 1890; Sacc., Syll. **10**, 263. 1892; Pet. et Syd. in Fedde, Rep. Beih. **42**, 415. 1927; in cortice *Vitis viniferae* emortuae in Gallia.

Observ.:

Praecipue propter conidiorum magnitudinem dubiae vel excludendaa sunt species sequentes:

— *C. ampelos* (Schw.) Fl. Tassi, Bull. Orto Bot. Siena, pag. 23. 1902; in sarmentis *Vitis* in Amer. bor.; ≡ *Sphaeropsis ampelos* (Schw.) Cke., Grev. **20**, 86. 1891; Sacc., Syll. **11**, 512. 1895; ≡ *Sphaeria ampelos* Schw., Syn. Amer. bor. no. 1637, Trans. Amer. Philos. Soc. 15. April 1831 N. ser. **4**, pag. 141—316. 1834; Sacc., Syll. **2**, 420. 1883.

— *C. berlandieri* Viala et Sauv., Journ. de Bot. pag. 364. 1891; Sacc., Syll. **10**, 263. 1892; in foliis *Vitis berlandieri, V. cinereae, C. candicantis* in Amer. bor.

Praeterea: *C. diplodiella* (Speg.) Sacc., Syll. **3**, 310. 1884; in baccis maturis *Vitis viniferae* in Italia bor., in Serbia (fide Ranojevic, Ann. Myc. **8**, 386. 1910) et in Bulgaria (fide Malkoff, Ann. Myc. **6**, 34. 1908) ≡ *Phoma diplodiella* Speg. in Ampelomicet. ital. in Riv. Viticol. Enol. Conegliano **2**, 339. 1878, est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**. 460. 1927, *Coniella diplodiella* (Speg.) Pet. et Syd.

In Cornaceis.

A. Pycnidiosporis $4 \times 1{,}5$ µ:

C. vagabundum Sacc., Nuovo Giorn. Bot. Ital. **7**, 318. 1875; Syll. **3**, 310. 1884; in ramis *Corni sanguineae* in Italia bor.

AA. Pycnidiosporis $5—10 \times 2{,}5—5$ µ:

C. aucubae Sacc., Atti Soc. Venet.-Trent. Sc. Nat. Padova **4**, 105. 1875; Syll. **3**, 310. 1884; in ramis ramulisque *Aucubae japonicae* in Italia bor. et Hispania.

Species includendae:

C. olivaceum. Bon. f. *cornicola* Massa, Ann. Myc. **10**, 289. 1912; Sacc., Syll. **25**, 248. 1931; in foliis *Corni sanguineae* in Italia bor.

C. sydowianum Pet. in Fedde, Rep. Beih. **42**, 359. 1927; in caulibus ramisque vivis decorticatis *Corni maris* in Moravia.

Observ.:

C. suspectum Allesch. in Rabh. Krypt. Fl. Deutschl. **7**, 33. 1903; in ramis *Corni sanguineae* in Italia bor., est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 112. 1927, *Sphaeropsis suspecta* Vestergren, Öfvers. K. Vetensk. Akad. Förhandl. no. 1, pag. 39. 1897.

In Araliaceis.

Pycnidiosporis $(3{,}5)4—6(8) \times (2.8)3—4(5)$ µ:

C. olivaceum Bon. in Fuck., Symb. pag. 377. 1869; Sacc., Myc. Ven. pag. 191 et Mich. **1**, 205. 1878, Syll. **3**, 305. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 370. 1927; Woll. et Hpfl., Z. Para-

sitenkde **9**, 617. 1937; in ramis siccis *Hederae helicis* in Europa et Amer. austr.;

≡ *Microsphaeropsis olivaceus* v. Höhn., Hedw. **59**, 267. 1917.

≡ *C. olivaceum* Bon. var. *hederae* Sacc., Syll. **3**, 305. 1884; Allesch. in Rabh. Krypt. Fl. **7**, 27. 1903; Woll. et Hpfl., Z. Parasitenkde **9**, 620. 1937.

Circa cetera synonima in Woll. et Hpfl. l. c. atque alias matrices apud Auctores plurimos vide: in Caprifoliaceis, Asclepiadaceis, Leguminosis, Cycadaceis, Myrtaceis, Palmis, Rhamnaceis, Rosaceis, Saxifragaceis, Linaceis, Magnoliaceis, Anacardiaceis, Ulmaceis, Ranunculaceis et Cactaceis.

Species includenda:

C. panacis Frag. et Cif., Bol. R. Soc. Españ. Hist. Nat. Madrid **27**, 329. 1928. Publ. Estac. Agron. Moca, Serie B., Bot. No. 11, pag. 32. 1928; in foliis vivis *Panacis* sp.

Observ.:

C. hederae (Desm.) Sacc. Mich. **1**, 204. 1878; Syll. **3**, 307, 1884; in ramulis foliisque *Hederae helicis* in Britannia, Gallia et Italia bor., est sec. Pet. et Syd. in Fedde, l. c. pag. 442, syn. *Cytopleae hederae* (Desm.) Pet. et Syd.

In Umbelliferis.

A. Pycnidiosporis 2—3,5 μ latis:

C. conoideum Sacc., Mich. **1**, 203. 1878; Syll. **3**, 316. 1884; in caule putri *Angelicae silvestris* nec non *Urticae* et *Scrophulariae* in Gallia (fide Woll. et Hpfl., Z. Parasitenkde **9**, 614. 1937, est contra syn. *Coniothyrii fuckelii* Sacc. v. in Rosaceis).

Species includendae:

C. bupleuri-fruticosi Pet. et Syd. in Fedde, Rep. Beih. **42**, 351. 1927; in ramis siccis *Bupleuri fruticosi* in Hispania [ex exicc. indicata ut *C. bupleuri* (P. Henn.) Gz. Frag.].

C. halosciadis Pet., Ann. Myc. **34**, 452. 1936; in ramis siccis *Halosciae scotici* in Fennia.

AA. Pycnidiosporis 4—6 μ latis:

C. stigmatoideum Sacc., Ann. Myc. **11**, 417. 1913; Syll. **25**, 246. 1931; in ramulis emortuis *Deverrae tortuosae* in Africa bor.

Species includendae:

C. olivaceum Bon. var. *bupleuri* Unamuno, Assoc. Españ. Prog. Cienc. Congr. de Lisboa, pag. 47. 1932; in caulibus *Bupleuri frutescentis* in Hispania.

C. physocaulis Bub. et Picbauer, Ann. Myc. **35**, 145. 1937; ad caules emortuos *Physocaulis nodosi* in Bulgaria.

Observ.:

C. bupleuri (P. Henn.) Died., Kryptfl. Mark Brandenburg **9**, 566.

1914; in caulibus siccis *Bupleuri ranunculoides* in Germania ≡ *Sphaeropsis bupleuri* P. Henn., Hedw. pag. 318. 1902, est, fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 419. 1927, probabiliter *Ascochytella.*

Adsunt etiam in Umbelliferis pro parte: *C. montagnei* Cast. (v. in Elaeagnaceis), in caulibus, penduculis fructibusque *Bupleuri fruticosi* in Gallia, sed. sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 424. 1927 est species dubia; nec non *C. cookei* Fl. Tassi (v. in Compositis).

In Plumbaginaceis.

Pycnidiosporis 3—4,5 × 2—2,7 μ vel 2,5—3 μ diam.:

C. armeriae Pet. et Syd. in Fedde, Rep. Beih. **42**, 345. 1927; in floribus siccis *Armeriae vulgaris* in Germania.

Observ.:

Adest autem pro parte in Plumbaginaceis: *C. scapisedum* Sacc. et Speg. (v. in Plantaginaceis), in scapis *Armeriae vulgaris* in Gallia. (Sec. Pet. et Syd. l. c. valde inverisimiliter est species una cum *C. armeriae* Pet. et Syd.).

In Primulaceis.

Pycnidiosporis 4—6,5 × 1,7—2,5 μ:

C. pusillum Woll., Z. Parasitenkde **9**, 635. 1937; in maculis ochroleucis irregularibus foliorum adhuc vivorum *Primulae veris* in Germania.

In Pyrolaceis.

C. pirolae Schembel — ubi ? —. sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 427. 1927 est ? *Mycosphaerella.*

In Eriacaceis.

Pycnidiosporis 2—4 × 1—3 μ:

C. vacciniicolum (Schw.) Starb., Beih. K. Svenska Vet. Akad. Handl. Stockholm **19**, Afd. 3, No. 2, pag. 78 (extr.). 1894; Sacc., Syll. **11**, 514. 1895; in ramulis *Vacciniorum* et *Ceanothi* (v. in Rhamnaceis) in Amer. bor.

An aut distinguendum?:

C. arctostaphyli (Vize) Fl. Tassi, Bull. Orto Bot. Siena, pag. 23. 1902; in foliis *Arctostaphyli glauci* in Amer. bor. ≡ *Sphaeropsis arctostaphyli* (Vize) Sacc., Syll. **3**, 297. 1884; ≡ *Macrodiplodia arctostaphyli* Vize, Grev. **5**, 190. 1877.

Quod comprehendit:

C. asterinum (Cke. et Harkn.) Fl. Tassi, Bull. Orto Bot. Siena, pag. 23. 1902; in foliis vivis *Arbuti manziesii* in Amer. bor. ≡ *Sphaeropsis asterina* (Cke. et Harkn.) Sacc., Syll. **3**, 298. 1884; ≡ *Macroplodia asterina* Cke. et Harkn., Grev. **9**, 82. 1881.

C. phyllogenum Sacc., Ann. Myc. **10**, 318. 1912; Syll. **22**, 973. 1913; in foliis languidis *Rhododendri* sp. in Italia centr.

≡ *C. olivaceum* Bon. f. *phyllogena* Sacc., Rev. Myc. **8**, 193. 1886; Syll. Add. **1—4**, 440. 1886; Syll. **10**, 265. 1892; in foliis vivis *Rhododendri* in Gallia (confirmaverunt Pet. et Syd. in Fedde, Rep. Beih. **42**, 426. 1927.

Observ.:

Propter insolitas conidiorum dimensiones *Coniothyrii arctostaphyli* (Vize) Fl. Tassi (8—12 × 5 μ), quae comprehendunt illas *Coniothyrii phyllogeni* Sacc. (7—9 × 4—5 μ) et *Coniothyrii asterini* (Cke. et Harkn.) Fl. Tassi (6 × 3,5 μ), hanc divisionem valde dubiam reputamus.

C. rhododendri P. Henn., Hedw. **42**, 220. 1903; in foliis *Rhododendri* in Germania est, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**. 428. 1927, species delenda.

C. leucothöes P. Henn., Hedw. **43**, 92. 1904; Sacc., Syll. **18**, 310. 1906; in foliis vivis *Leucothöes*, sec. Pet. et Syd., Ann. Myc. **23**, 238. 1925, est species excludenda.

In Ebenaceis.

Pycnidiosporis 5—8 μ diam. (Pet.):

C. ebeni Gz. Frag., Bol. Soc. Espan. Hist. Nat. **16**, 173. 1916; Sacc., Syll. **25**, 236. 1931; Pet., Ann. Naturh. Mus. Wien **52**, 376. 1941 publ. 1942; in ramis siccis spinisque *Ebeni stellati* in Persia.

In Sapotaceis.

Pycnidiosporis 4—5 × 2 μ:

C. palaquii Zimm., Bull. Inst. Bot. Buitenz. **10**, 26. 1901; Sacc., Syll. **16**, 1155. 1902; Syll. **18**, 305. 1906; n foliis *Palaquii oblongifolii* in insula Java.

In Styracaceis.

C. superficiale Fl. Tassi, Bull. Lab. Orto Bot. Siena pag. 152. 1899; Sacc., Syll. **16**, 909. 1902; in truncis subvivis denique decorticatis *Styracis officinalis* in Italia centr., est propter perithecia superficialia „strato fuligineo saepe insidentia" species dubia vel excludenda.

In Convolvulaceis

Pycnidiosporis 6.5—10 × 5—8 μ:

C. evolvuli (Pat.) Fl. Tassi, Bull. Orto Bot. Siena pag. 24. 1902; in caulibus exsiccatis *Evolvuli* in Palaestina ≡ *Sphaeropsis evolvuli* Pat. Rev. Myc. pag. 182. 1886; Sacc., Syll. **10**, 251. 1892.

Species includenda:

C. sepium Fairm., Mycol. **10**, 256. 1918; Sacc., Syll. **25**, 235. 1931; Pet. et Syd. in Fedde, Rep. Beih. **42**, 359. 1927; in caulibus vetustis *Convolvuli sepii* in Amer. bor.

In Solanaceis

Pycnidiosporis 4.5—6 × 3 μ:

C. lycii Brun., Bull. Soc. Bot. France pag. 223. 1893; Sacc., Syll. **11**, 515. 1895; in ramulis *Lycii barbari* in Gallia.

Species inculendae:

C. commixtum Fl. Tassi, Bull. Lab. Orto Bot. Siena pag. 13. 1899; Sacc., Syll. **16**, 910. 1902; in caulibus exsiccatis *Solani jasminoidis* in Italia centr.

C. olivaceum Bon. f. *cestri* Fl. Tassi, Bull. Lab. Orto Bot. Siena pag. 32. 1899; Sacc., Syll. **16**, 910. 1902; in ramulis tenellis exsiccatis *Cestri nocturni* in Italia centr.

Observ.:

C. withaniae Ahmad, Sydowia **5**, 393. 1951; in ramis emortuis *Withaniae somniferae* in Pakistan, est, praecipue propter conidiorum magnitudinem, species excludenda.

C. mesopotamicum Bub., Ann. Naturh. Mus. Wien **28**, 210. 1914; Sacc., Syll. **25**, 245. 1931; in ramis et spinis emortuis *Lycii barbari* ad confines Mesopotamiae et Arabiae bor., sec. Pet. in Sydowia **3**, 314. 1949 (v. etiam Pet. et Syd. in Fedde, Rep. Beih. **42**, 424. 1927) est, una cum *C. nitrariae* Bub., *C. rude* Bub. et *C. tenue* Bub., ad interim collocandum in *Ascochytella rudi* (Bub.) Pet. et Syd., Ann. Myc. **22**, 329. 1924, in ramis siccis *Dianthi* sp.

In Scrophulariaceis.

Pycnidiosporis 3—5 × 2—3 μ:

C. valdivianum Speg., Rev. Fac. Agron. y Veterin. de la Plata **6**, 246. 1910; Sacc., Syll. **22**, 972. 1913; in caulibus siccis *Digitalis purpureae* in Amer. austr.

Species includenda:

C. rhinanthi Died. ap. Pet. et Syd. in Fedde, Rep. Beih. **42**, 342. 1927; in ramis siccis *Alectoroluphi majoris* in Germania.

Observ.:

C. scrophulariae (Fuck.) Sacc., Syll. **3**, 316. 1884; in caulibus *Scrophulariae ehrharti* in Germania ≡ *Phoma scrophulariae* Fuck., Symb. Myc. pag. 112. 1869, est, propter descriptionem sine pycnidiorum et conidiorum dimensionibus, species dubia.

C. pentastemonis Earle in Tracy et Earle ap. Greene, Pl. Bakerianae **2**, fasc. I, 25. 1901; Sacc., Syll. **16**, 1155. 1902; Syll. **18**, 304.

1906; in foliis emortuis caulibusque *Pentastemonis* in Amer. bor., est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 427. 1927, species dubia.

Woll. et Hpfl. (Z. Parasitenkde. **9**, 614. 1937) indicant in matricibus *Coniothyrii fuckelii* Sacc. etiam *Scrophularia* quia fecerunt *C. conoideum* Sacc. (Mich. **1**, 203. 1878; Syll. **3**, 316. 1884 in caule putri *Angelicae silvestris* (Umbell.), *Urticae* et *Scrophulariae* synonimum *Coniothyrii fuckelii* Sacc. (v. in Rosaceis).

In Bignoniaceis.

A. Pycnidiosporis 3—5 × 2—3 μ:

C. tecomae-radicantis (Sacc.) nob., n. comb.; in planta eiusdem nominis in Italia bor.

= *C. fuckelii* Sacc. f. *tecomae — radicantis* Sacc., Mich. **1**, 207. 1878; Syll. **3**, 306. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 404. 1927.

Species includenda:

C. oroxyli P. Henn., Hedw. **47**, 263. 1908; Sacc., Syll. **22**, 973. 1913; Pet. et Syd. in Fedde, l. c. pag. 386; in capsulis putridis *Oroxyli indici* in Ins. Philipp.

AA. Pycnidiosporis 6—7 × 3.5—4 μ:

C. catalpae-syringifoliae (Sacc.) nob., n. comb.; in planta eiusdem nominis in Italia bor.

= *C. olivaceum* Bon. f. *catalpae-syringifoliae* Sacc., Mich. **1**, 205. 1878; Syll. **3**, 305. 1884.

Species inculdenda:

C. olivaceum Bon. var. *tecomae* Sacc., Ann. Myc. **4**, 267, 1906; Syll. **22**, 973. 1913; in *Tecoma radicante* in Amer. bor.

In Labiatis.

A. Pycnidiosporis crasse tunicatis:

C. maderense Pet., Ann. Myc. **29**, 124. 1931; in ramis siccis *Teucrii betonici* in insula Madera. . . . .

= ? *C. lavandulae* Maire, Publ. Inst. Bot. Barcelona, **3**, 17. 1937; in foliis languentibus *Lavandulae verae* in Hispania.

AA. Pycnidiosporis tenuiter tunicatis:

B. Pycnidiosporis usque 5—7 × 2.5—4 μ:

C. septorioides Cke. et Mass., Grev. **20**, 36. 1891; Pet. et Syd. in Fedde, Rep. Beih. **42**, 395. 1927; in foliis vivis *Prostantherae lasianthae* in Australia.

Species includenda:

C. phlomidis Jaap., Ann. Myc. **14**, 33. 1916; Pet. et Syd. in Fedde l. c. pag. 387; in caulibus emortuis *Phlomidis fruticosae* in Dalmatia.

BB. Pycnidiosporis minoribus pro more 3—5 × 2—2.5 μ usque 3.5 μ crassis:

C. salvicolum Ell. et Ev., Journ. Myc. pag. 49. 1888; in caulibus vetustis, dealbatis et decorticatis *Salviae officinalis* in Amer. bor.

Species includenda:

C. thymi Hollòs, Math. Termész. Kőzlèm. Myg. Tudom. Akad. **35**, 18. 1926; in caulibus siccis *Thymi marschalliani* in Hungaria.

In Verbenaceis

Pycnidiosporis 4—5 × 4 μ:

C. gmelinae P. Henn., Hedw. **47**, 263. 1908; Sacc. Syll. **22**, 973. 1913; in ramis siccis *Gmelinae villosae* in Ins. Philipp.

Observ.:

C. callicarpae Cke., Grev. **12**, 22. 1883; Sacc., Syll. **3**, 311. 1884 in ramis *Callicarpae* in Amer. bor., est sec. Pet. et Syd. in Ann. Myc. **22**, 327. 1924, species delenda.

In Plantaginaceis.

Pycnidiosporis 2—3 × 1.5—2 μ:

C. scapisedum Sacc. et Speg., Mich. **1**, 204. 1878; Sacc., Syll. **3**, 316. 1884; in scapis emortuis *Plantaginis lanceolatae* in Italia bor. et in scapis *Armeriae plantaginae* in Gallia. (v. in Plumbaginaceis).

In Apocynaceis.

Pycnidiosporis 5—6 × 4 μ:

C. phomoides (Crouan) Sacc. (non Kirschst.; v. in Leguminosis), Bull. Soc. Roy. Bot. Belgique **31**, 233. 1892. Sacc., Syll. **11**, 515. 1895; in caule emortuo *Vincae majoris* in Gallia.

In Asclepiadaceis.

Pycnidiosporis 4.5—5.5 × 2—3 μ:

C. mattirolianum Ferraris, Malpighia **16**, 26. 1902; Sacc., Syll. **18**, 310. 1906; in foliis languidis *Cynanchi vincetoxici* in Italia bor.

Species includenda:

C. herbarum Schulz. et Sacc., Hedw. **23**, 89. 1884; Sacc., Syll. **3**, 317. 1884; in caulibus *Asclepiadis syriacae* in Slavonia (non *C. herbarum* Cke. et Ellis v. in Liliaceis).

Observ.:

C. sphaerosporum (Peck) Fl. Tassi, Bull. Orto Bot. Siena pag. 25. 1902; in caule emortuo *Asclepiadis cornuti* in Amer. bor. est, praecipue propter conidiorum magnitudinem, *Sphaeropsis sphaerospora* Peck, 39 Rep. pag. 46. 1886.

C. amphistelmae P. Henn., Hedw. **47**, 270. 1908; Sacc., Syll. **22**, 973. 1913; in caulibus siccis *Amphistelmae* sp. in Brasilia, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 417. 1927, referendum est ad species excludendas v. delendas.

Adest autem in Asclepiadaceis pro parte: *C. olivaceum* Bon (v. in Araliaceis) in ramis siccis *Periplocae gracae* in Hispania (fide Gz. Frag., Bol. Real Soc. Españ. Hist. Nat. **23**, 5. 1925).

In Oleaceis.

A. Pycnidiosporis 2.5—4 μ latis:

C. discincola (Ell. et Ev.) Keissler, Ann. Naturhist. Mus. Wien **35**, 21. 1922; in foliis *Forsythiae* cultae in Amer. bor. ≡ *Phyllosticta discincola* Ell. et Ev., Proc. Acad. Nat. Sci. Philadelphia pag. 454. 1893 publ. 1894; Sacc., Syll. **11**, 474. 1895.

Species includendae:

C. morianum Trav., Ann. Myc. **1**, 230. 1903; Sacc., Syll. **18**, 309. 1906; in foliis vivis *Osmanthi fragrantis* in Italia bor.

C. chionanthi Fairm., Mycologia **5**, 248. 1913; Sacc., Syll. **25**, 242. 1931; Pet. et Syd. in Fedde, Rep. Beih. **42**, 354. 1927; in ramis decorticatis *Chionanthi virginicae* in Amer. bor.

AA. Pycnidiosporis latioribus (4—6 μ latis):

C. jasmini (Thüm.) Sacc., Syll. **3**, 309. 1884; in ramulis vivis *Jasmini officinalis* in Lusitania et Italia bor. (Pet., Ann. Myc. **20**, 136. 1922).

≡ *Phoma jasmini* Thüm., Journ. Sci. Mat. Phys. Nat. **6**, 249. 1878.

= *C. castagnei* Sacc., Syll. **3**, 309. 1884; in ramulis siccis et exiguis *Jasmini fruticantis* in Rhenogovia et *J. multiflori* in Moravia (Pet. et Syd. in Fedde, Rep. Beih. **42**, 377. 1927).

= *C. patouillardii* Fl. Tassi, Bull. Orto Bot. Siena pag. 25. 1902; in ramulis emortuis *Jasmini* in Palaestina.

≡ *Sphaeropsis jasmini* Pat., Rev. Myc. **8**, 182. 1886.

Species includendae:

C. ligustri Brun., Bull. Soc. Sci. Nat. Ouest-France, Nantes **4**, 35. 1894; Sacc., Syll. **11**, 515. 1895; ad ramos emortuos *Ligustri ovalifolii* in Gallia nec non in ramulis *Ligustri* sp. in Lusitania (da Camara, Agron. Lusit. **10**, 305. 1948).

C. oleae Pollacci, Atti Ist. Bot. Pavia **9**, 3. 1904; Sacc., Syll. **18**, 305. 1906; in foliis vivis *Oleae europaeae* in Italia centr.

Observ.:

C. fragosoi Cab., Publ. Secc. Cienc. Nat. Barcelona, pag. 45. 1918, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 421. 1927, est species dubia.

C. orni P. Henn., Hedw. **42**, 220. 1903; Sacc., Syll. **18**, 305. 1906, sec. Pet. et Syd. in Fedde, l. c. pag. 426, est species delenda.

C. fraxini (Died.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 367. 1927 ≡ *Haplosporella fraxini* Died. in Kryptfl. Mark Brandenburg **9**, 588. 1914; in ramis siccis *Fraxini excelsioris* in Germania quia parasiticum in *Botryiodiplodia fraxini* excludendum est ab Oleaceis (v. in Fungis).

Adest autem pro parte in Oleaceis: *C. insitivum* Sacc., in ramulis *Syringae* (species exclud. v. in Leguminosis).

In Rubiaceis.

A. Pycnidiosporis 2—3,5 μ latis:

C. cephalanthi Ell. et Ev., Journ. Myc. pag. 149. 1889; Sacc., Syll. **10**, 263. 1892; in foliis vivis *Cephalanthi* in Amer. bor., cuius probabiliter est synonimun:

C. kansense Ell. et Barth. apud Pet. et Syd. in Fedde, Rep. Beih. **42**, 354. 1927; in ramis siccis decorticatis *Cephalanthi occidentalis* in Amer. bor., nam. Pet. et Syd. adscribunt quasdam morfologicas differentias diverso horum fungorum substratui.

Species: includendae:

C. coffeae Zimm. (non P. Henn.),Centralbl. f. Bakter. **8**, 216. 1902; Sacc., Syll. **18**, 310. 1906; in foliis *Coffeae libericae* in India orient.

C. coffeae P. Henn. (non Zimm.), Hedw. **47**, 263. 1908; Sacc., Syll. **22**, 972. 1913; Pet. et Syd. in Fedde, Rep. Beih. **42**. 356. 1927; in ramulis siccis *Coffeae arabicae* in Ins. Philipp.

C. nerterae Jørstad, Result. Norweg. Exped. T. da Cunha **14**, 26. 1947; in *Nertera granadensi* et *N. depressa* in insula Tristan de Cunha.

AA. Pycnidiosporis 4—6 μ latis:

C. galii Trotter, Nuovo Giorn. Bot. Ital. pag. 22. 1916; Sacc., Syll. **25**, 245. 1931; in foliis caulibusque siccis *Galii parisiensis* in Africa bor.

Observ.:

C. coptospermae P. Henn. in Woeltzkow, Reise Ostafrika **3**, 32. 1908; Sacc., Syll. **22**, 972. 1913, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 420. 1927, est species dubia.

In Caprifoliaceis.

A. Pycnidiosporis fere 8—10 × 7—8 μ:

C. sambucinum (Cke.) Fl. Tassi, Bull. Orto Bot. Siena, pag. 25. 1902; in ramis *Sambuci* sp. in Amer. bor. ≡ *Macroplodia sambucina* Cke., Grev. **7**, 2. 1878; ≡ *Sphaeropsis sambucina* (Cke.) Sacc., Syll. **3**, 297. 1884.

= *C. sambuci* Earle; Bull. New York Bot. Gard. pag. 295. 1904; in ramis emortuis decorticatis *Sambuci* sp. in Amer. bor.

AA. Pycnidiosporis minoribus (pro more 3,5—5 × 2,5—3,5 μ rare usque ad 6—7 × 3—5 μ):

C. fuscidulum Sacc., Mich. **1**, 205. 1878; in ramis decorticatis *Sambuci nigrae* in Italia bor. et Gallia (fide Woll. et Hpfl., Z. Parasitenkde **9**, 634. 1937 = ? *C. lignorum* Sacc.[1]).

Species includendae:

C. clandestinum Karst., Rev. Myc. **10**, 150. 1888; Pet. et Syd. in Fedde, Rep. Beih. **42**, 406. 1927; ad ramos emortuos *Sambuci racemosae* in Fennia (Fide Woll. et Hpfl., Z. Parasitenkde **9**, 620. 1937, est syn. *Coniothyrii olivacei* Bon.; fide Allesch. in Rabh. Krypt. Fl. **7**, 53. 1903, cum *C. subcorticale* Karst. species una esse videtur.)[2]).

C. viburni Hollós (non Died.), Ann. Mus. Nat. Hung. **4**, 356. 1906; in ramis siccis *Viburni opuli* in Hungaria (fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 414. 1927 = *C. viburni* Died.).

C. viburni Died. (non Hollós), Kryptfl. Mark Brandenburg **9**, 578. 1914; Pet. et Syd. in Fedde, Rep. Beih. **42**, 414. 1927; in ramis vivis *Viburni opuli* et non sec. Died. *Viburni lantanae* (fide Pet. et Syd. l. c.) in Germania.

C. olivaceum Bon. f. *lonicerae-xylostei* Sacc., Mich. **1**, 205. 1878; in planta eiusdem nominis nec non in ramis siccis *Lonicerae implexae* (fide Jaap, Ann. Myc. **14**, 33. 1916) in Dalmatia.

Observ.:

C. viburni Hollós f. *foliicola* Gz. Frag., Publ. Cienc. Nat. Barcel. Ser. Bot. **2**, 127. 1917; in foliis dejectis putrescentibus *Viburni tini* in Hispania, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 431. 1927, est species dubia.

C. subcorticale Karst., Hedw. **27**, 104. 1888; in ramis emortuis *Sambuci racemosae* in Fennia, sec. Pet. et Syd., Ann. Myc. **22**, 322. 1924, referendum est ad species dubias quamvis probabiliter = *C. clandestinum* Karst.; fide Woll. et Hpfl., Z. Parasitenkde **9**, 620. 1937 est syn. *Coniothyrii olivacei* Bon.

C. olivaceum Bon. f. *hispanica* Gz. Frag. in Trab. Mus. Nac. Cienc. Nat. Madrid Ser. Bot. no. 5, pag. 16. 1914; in caulibus ramisque siccis *Lonicerae hispanicae* in Hispania, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 426. 1927, est species delenda.

Adest autem in Caprifolicaceis pro parte: *C. olivaceum* Bon. (v. in Araliaceis); in ramulis *Sambuci racemosae* (Sacc., Syll. **3**, 305. 1884) in Germania, Italia, Gallia, Lusitania et Amer. austr.

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[1]) Fide Diedicke, Ann. Myc. **11**, 45. 1913 l'esemplare di Sydow, Myc. march. 4445contiene solamente *Phomopsis sambucina* (Sacc.) Trav.

[2]) Fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 407. 1927, una collezione raccolta da Karsten quale *C. fuscidulum* Sacc. é uguale a *C. clandestinum* Karst. salvo piccole differenze.

In Valerianaceis.

Pycnidiosporis 6—8 μ longis:

C. infuscans Ell. et Ev., Prov. Acad. Phil. pag. 362. 1894; Sacc., Syll. **11**, 515. 1895; in caulibus emortuis *Valerianae edulis* in Amer. bor.

In Dipsacaceis.

Pycnidiosporis 6,5—9 × 2—3,5 μ:

C. dipsacinum (Bub.) Keissl., Ann. Myc. **21**, 72. 1923; in caulibus *Dipsaci pilosi* in Hungaria ≡ *Phoma dipsacina* Bub., Növem. Közlem **6**, 102. 1907; Sacc., Syll. **22**, 885. 1913.

Observ.:

Adest pro parte in Dipsacaceis: *C. rupicolum* Pet., Ann. Naturhist. Mus. Wien **52**, 375. 1941 (Publ. 1942); in caulibus emortuis *Scabiosae variifoliae* in Graecia (v. in Compositis).

In Cucurbitaceis.

C. arthurianum Sacc. et Berl., Misc. Myc. **2**, no. 71. 1885; Syll. Add. **1—4**, 323. 1886 et Syll. **10**, 261. 1892, species dubia reputamus quod est sine matrice certa.

C. cucurbitacearum (Fl. Tassi) Sacc. et D. Sacc., Syll. **18**, 309. 1906; in foliis vivis *Lagenariae vulgaris* in Italia centr. ≡ *Phyllostictella cucurbitacearum* Fl. Tassi, Bull. Lab. Orto Bot. Siena **4**, 4. 1901, est fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 420. 1927, species excludenda.

In Campanulaceis.

A. Pycnidiosporis 3,5—4 μ diam.:

C. lobeliae (Berk. et Br.) Petch, Ann. Roy. Bot. Gard. Paradenya **9**, 156. 1924; in *Lobelia nicotianaefolia* in Insula Ceylon. ≡ *Phoma lobeliae* Berk. et Br., F. Ceylon no. 802. Journ. Linn. Soc. **14**, 20—140. 1875; Sacc., Syll. **3**, 132. 1884.

AA. Pycnidiosporis 5,5—8 × 3—5 μ:

C. campanulae (Sacc. et Speg.) Keissl., Ann. Naturhist. Mus. Wien **35**, 21. 1922; in foliis *Campanulae trachelii* in Italia bor. et *C. glomeratae* in Sibiria ≡ *Phyllosticta campanulae* Sacc. et Speg., Mich. **1**, 151. 1878; Syll. **3**, 51. 1884.

= *C. campanulae* Hollós, Ann. Mus. Nat. Hungar. **8**, 7. 1910; Sacc., Syll. **22**, 972. 1913; in caulibus siccis *Campanulae glomeratae* in Hungaria.

In Compositis.

A. Pycnidiosporis pro more 6—10 × 5—7,5 μ, rarius longioribus:

C. cookei Fl. Tassi, Bull. Orto Bot. Siena **4**, 24. 1902; in caulibus herbaceis *Compositarum* et *Umbelliferarum* in Britannia;

≡ *Sphaeropsis herbarum* Cke. et Mass., Grev. **16**, 78. 1887; Sacc., Syll. **3**, 251. 1884.

Species includendae:

C. inulae Jaap, Ann. Myc. **14**, 34. 1916; Pet. et Syd. in Fedde, Rep. Beih. **42**, 375. 1927; Sacc., Syll. **25**, 235. 1931; in caulibus vetustis *Inulae candidae* in Dalmatia.

C. inulae Jaap var. *foliicola* (Jaap) Pet. et Syd. in Fedde, l. c. pag. 376; in foliis siccis *Inulae candidae* in Dalmatia (conidiis minoribus) ≡ *C. foliicola* Jaap, Ann. Myc. **14**, 34. 1916.

C. artemisiae (Gz. Frag.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 346. 1927; in ramis siccis *Artemisiae* sp. in Hispania; ≡ *C. olivaceum* Bon. f. *artemisiae* Gz. Frag., Mem. R. Acad. Cienc. Artes Barcelona 3, **15**, 438. 1920.

C. jaenense Pet., Ann. Myc. **29**, 123. 1931; in ramis siccis *Rebaniae* (pro errore?; verisimiliter est *Relhania*) *sphaerocarpae* in Hispania.

C. rupicolum Pet., Ann. Naturhist. Mus. Wien **52**, 375. 1941 (Publ. 1942); in foliis emortuis *Chamaepeucis muticae* nec non in caulibus emortuis *Scabiosae variifoliae* (v. in Dipsacaceis) in Graecia.

C. helichrysii Unam., An. Jard. Bot. Madrid **2**. 73. 1941 (Publ. 1942); in caulibus siccis *Helicrysii serotini* in Hispania.

AA. Pycnidiosporis minorbius . . . . . B

B. Pycnidiosporis 5,5—7,5 × 3—4 μ, rarius usque 9 μ longis, obscurioribus:

C. celmisiae Syd., Ann. Myc. **22**, 311. 1924; Pet. et Syd. in Fedde, Rep. Beih. **42**, 353. 1927; in foliis vivis *Celmisiae* sp. in Nova Zelandia.

BB. Pycnidiosporis 3—5 μ diam. vel longis, dilutioribus:

C. helianthi Ell. et Barth., Journ. Mycol. **8**, 175. 1902; Sacc., Syll. **18**, 305. 1906; Pet. et Syd. in Fedde, Rep. Beih. **42**, 371. 1927; in caulibus emortuis *Helianthi annui* in Amer. bor.

Species includenda:

C. anacycli Gz. Frag., Congr. de Coimbra Cienc. Nat. Assoc. Espan. para el Progr. de las Cienc. **6**, 22. 1925; in caulibus siccis *Anacycli radiati* in Lusitania.

In Lilaceis.

A. Pycnidiosporis (5)6—9(11—14) × (3)4—6(7) μ:

C. burchardiae Mc. Alp., Proc. Linn. Soc. New. S. Wal. pag. 121. 1904; Sacc., Syll. **18**, 310. 1906; in foliis vivis *Burchardiae umbellatae* in Australia.

Species includendae:

C. bulbicola Hollós, Ann. Mus. Nat. Hung. **5**, 464. 1907; Sacc., Syll. **22**, 975. 1913; in bulbis *Muscari comosi* in Hungaria.

C. bartholomaei Dearn. et Barth., Mycol. **16**, 162. 1924; Pet. et Syd. in Fedde, Rep. Beih. **42**, 411. 1927; in stipite et in foliis *Yuccae whipplei* in Amer. bor.

C. semelinum Caballero, An. Jard. Bot. Madr. **1**, 198. 1941; in cladodiis vivis *Semeles androgynae* in Hispania.

C. hypoglossi Mutto, Atti R. Ist. Bot. Pavia **16**, 207. 1916 (extr. 1914); Sacc., Syll. **25**, 241. 1931; in cladodiis *Rusci hypoglossi* in Italia bor. = *C. sardoum* Prota, Ann. Fac. Agr. Sassari **3**, 49. 1955; in cladodiis vivis *Rusci hypophylli* et *R. hypoglossi* in Sardinia.

AA. Pycnidiosporis (3)4—7 × (2)3—4(5) µ:

C. concentricum (Desm.) Sacc., Mich. **1**, 204. 1878; Syll. **3**, 317. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 409. 1927; Woll. et Hopf., Z. Parasitenkde **9**, 615. 1937; in foliis *Yuccae gloriosae, Y. filamentosae, Y. aloifoliae, Y. flaccidae, Y. glaucae, Fourcroyae excelsae, F. giganteae, Agavis americanae, A. mexicanae, Dracaenae* sp., *Dasylirion* sp., *Cordyline* sp. (Ferraris, Tratt. Pat. Veg. **1**, 966. 1938) in Europa, Ceylon, Amer. bor., centr. et austr., India, Japonia.

≡ *Phoma concentrica* Desm., Ann. Sci. Nat. 2, **13**, 189. 1840.

≡ *Papularia concentrica* Desm., Plant. Crypt. Fr. no. 1085. 1840.

≡ *Coniothyrium herbarum* Cke. et Ell., Grev. **6**, 1. 1877.

≡ *C. inops* Sacc., Mich. **2**, 142. 1880.

≡ *Dothisphaeropsis concentrica* v. Höhn., Hedw. **60**, 195. 1918.

= *C. biforme* Wint., Bol. Soc. Brot. **2**, 52. 1884 (1883 extr.); Sacc., Syll. **3**, 318. 1884; in folia emortua *Fourcroyae* in Lusitania.

= *C. dasylirii* Celotti (non Speg.), Mic. Montpell. pag. 22. 1887; Sacc., Syll. **10**, 267. 1892; in foliis emortuis *Dasylirii gracilis* in Gallia et Italia centr.

= *C. yuccae* Speg., Myc. Argent. ser. 2, pag. 82, 1902; Sacc., Syll. **18**, 307. 1906; in foliis emortuis *Yuccae gloriosae* in Amer. austr.

= *C. dehiscens* Sacc. et Syd., ap. Sacc., Syll. **16**, 911. 1902; ad folia emortua *Dasylirii* sp. culti in Amer. austr. ≡ *C. dasylirii* Speg. (non Celotti), Fg. Arg. novi v. crit. pag. 320. 1899.

= *C. bartholomaei* Dearn. et Barth. var. *yuccae-glaucae* (Sacc.) Pet. et Syd. in Fedde, Rep. Beih. **42**, 412. 1927; in foliis siccis *Yuccae glaucae* in Amer. bor. ≡ *C. concentricum* (Desm.) Sacc. var. *yuccae-glaucae* Sacc., Atti R. Accad. Sc. Nat. Lett. Arti Padova **33**, 168. 1917.

= *C. dracaenae* Stevens, Bernice P. Bishop Mus. Bull. **19**, 135. 1925; Pet., Ann. Myc. **7**, 400, 1953; in *Dracaena aurea* et *D.* sp. in Insula Hawai.

Species includendae:

C. smilacis Pat., Cat. rais. pl. cell. Tunisie, pag. 119. 1897; Sacc., Syll. **14**, 924. 1899; in ramulis *Smilacis* in Afr. bor.

C. concentricum (Desm.) Sacc. var. *pincenectia* S. Cam., ap. Almeida, Contrib. Myc. Portugal, pag. 35. 1903; Sacc., Syll. **3**, 317. 1884; Pet. et Syd. in Fedde, Rep. Beih. **42**, 410. 1927; in foliis siccis *Nolinae tuberculatae* et *N. recurvatae* (da Camara, Bol. Agric. Lisboa 2, **1**, 41. 1936) in Lusitania. (Haec species sec. Pet. et Syd. l. c. a typo differt propter pycnidiorum stroma basale.)

C. asphodeli Gz. Frag., Bol. R. Soc. Esp. Hist. Nat. Madrid **24**, 447. 1924; in caulibus siccis *Asphodeli morisiani* in Hispania.

C. schoenocauli Syd., Ann. Myc. **28**, 183. 1930; in caulibus emortuis putrescentibus *Schoenocauli officinalis* in Amer. austr.

Observ.:

C. henriquesii Thüm. [non (Thüm.) Fl. Tassi, v. in Rutaceis], Contr. ad Fl. Myc. Lusit. ser. 3, no. 338, Inst. Rev. Scient. e litterar. Coimbra **28**, 1880—81. Coimbra 1881; Sacc., Syll. **3**, 318. 1884; in foliis emortuis *Fourcroyae sellowii* in Lusitania, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 422. 1927, est *Microdiplodia henriquesii* (Thüm.) Pet. et Syd., Ann. Myc. **23**, 219. 1925.

C. hysteroideum Karst., Hedw. **29**, 149. 1890; Sacc., Syll. **10**, 267. 1892; ad *Dasylirion* in Amer. bor., est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 423. 1927, *Microdiplodia hysteroidea* (Karst.) Pet. et Syd., Ann. Myc. **22**, 321. 1924.

C. phormii Speg., Ann. Mus. Nac. Buenos Aires **23**, 114. 1912; Sacc., Syll. **25**, 240. 1931; in foliis languidis v. emortuis *Phormii tenacis* in Amer. austr., sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 427. 1927, est species delenda.

C. xanthorreae P. Henn., Hedw. **42**, 86. 1903; Sacc., Syll. **18**, 307. 1906; in foliis *Xanthorreae gracilis* in Australia, sec. Pet. et Syd. Ann. Myc. **23**, 265. 1925 et in Fedde, l. c. pag. 431, est species excludenda (probabiliter est *Mycosphaerella* sp.).

In Juncaceis.

C. junci Ell. et Ev., Journ. Mycol. **8**, 12. 1902; Sacc., Syll. **18**, 307. 1906; in scapis *Junci baltici* in Amer. bor., species dubia reputamus propter sporophororum longitudinem.

C. luzulinum Pet., Ann. Myc. **19**, 125, 1921; in culmis siccis *Luzulae nemorosae* in Moravia, est *Ascochytella luzulina* Pet. (v. Ann. Myc. **23**, 238. 1925 et in Fedde, Rep. Beih. **42**, 423. 1927).

In Agavaceis.

C. agaves (Mont.) Sacc., Syll. **3**, 318. 1884 ≡ *Phoma agaves* Dur. et Mont., Fl. Alg. pag. 605, Mont. Syll. no. 980; in foliis emarcidis

Agavis americanae in Algeria, *Agavis* sp. in India (H. et P. Syd. et E. J. Butler, Ann. Myc. **14**, 193. 1916), sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 322. 1927, est syn. *Coniothyrinae agaves* (Dur. et Mont.) Pet. et Syd. cum *C. concentrico* var. *agaves* Sacc. l. c. pag. 317.

In Cyperaceis.

A. Pycnidiosporis 4—6 × 2—3 μ:

C. fallax Rolland, Rev. Myc. **128**, 167. 1892; Sacc., Syll. **11**, 515. 1895; ad folia sicca *Caricis ripariae* in Gallia.

Species includenda:

C. boyeri Fl. Tassi, Bull. Orto Bot. Siena **5**, 23. 1902; in *Scirpo* et in foliis siccis *Acori calami* (Araceae) in Gallia.

≡ *Sphaeropsis scirpi* Boy. et Jacz., Mat. Myc. Montpell. pag. 39. 1894; Sacc., Syll. **11**, 514. 1895.

≡ *C. scirpi* (Boy. et Jacz.) Allesch. (non Trail), in Rabh. Krypt. Fl. **7**, 56. 1903.

AA. Pycnidiosporis 9—10 × 4—5 μ:

C. scirpi Trail [non (Boy. et Jacz. Allesch.], Trans. Crypt. Scot. pag. 44. 1889; Sacc., Syll. **10**, 266. 1892; in calamis emortuis *Heleocharidis palustris* in Britannia.

In Graminaceis.

A. Pycnidiosporis 5—12 × 3,5—6 μ:

C. sasae Syd., Ann. Myc. **37**, 242. 1939; in foliis languidis *Sasae borealis* in Japonia.

AA. Pycnidiosporis 4—6 usque 9—10 × 2—3,5 usque 4 μ:

C. fuegianum Speg., F. Fueg. no. 403, Bol. Acad. Nac. Ci. Cordoba **11**, 1887; Sacc., Syll. **10**, 266. 1892; in foliis culmisque putrescentibus *Poae forsteri* in Patagonia.

Species includendae:

C. phalaridis Fautr. et Roum., Rev. Myc. **13**, 169. 1891; Sacc., Syll. **10**, 267. 1892; in vaginis praecipue prope nodos culmorum *Phalaridis arundinaceae* in Gallia.

C. brevisporum Miyake, Journ. Colleg. Agricult. Tokyo **2**, 256. 1910; Sacc., Syll. **22**, 976. 1913; in foliis *Oryzae sativae* in Japonia et Sina. = *C. japonicum* Miyake, l. c.; Sacc., Syll. **22**, 975. 1913; in foliis *Oryzae sativae* in Japonia.

C. panici Syd. ap. Chardon et Toro, Journ. Departm. Agricult. Porto Rico **14**, 276. 1930; in *Panico maximo* in Antillia.

C. maydis Saccas, Rev. Path. Vég. **30**, 166. 1951; in foliis vivis *Zeae maydis* in Africa aequat. gallica.

C. sorghi Saccas, Agron. Trop. Nogent., **9**, 149, 1954; in seminibus *Sorghi vulgaris* in Africa aequat. gallica.

Observ.:

Reperire non potuimus descriptionem harum specierum:

— *C. praeclarum* Fairm., Proc. Rochester Acad. Sci. **6**, 121. 1922; in culmis *Graminis* cuiusdam in Amer. bor.
— *C. stipae* Săvul. et Sandu, Mem. Sect. Sci. Acad. Roum. 3, **15**, 462. 1940; in foliis emortuis *Stipae capillatae* in Rumania.

Praecipue propter coniodiorum magnitudinem vel sporophororum dubias vel excludendas species sequentes reputamus:

— *C. subglobosum* (Cke.) Fl. Tassi, Bull. Orto Bot. Siena, pag. **25**. 1902 ≡ *Sphaeropsis subglobosa* Cke. in Grev.; Sacc., Syll. **3**, 303. 1884; in culmis *Bambusae* in Guian. angl.
— *C. inconspicuum* Cke., Grev. **16**, 8. 1888; Sacc., Syll. **10**, 266. 1892; in foliis *Gynerii argentei* in Britannia.
— *C. tritici* (Cke. et Mass.) Fl. Tassi, Bull. Orto Bot. Siena, pag. 26. 1902 ≡ *Sphaeropsis tritici* Cke. et Mass., Grev. **16**, 75. 1888; Sacc., Syll. **10**, 258. 1892; in foliis vaginisque emortuis *Tritici* in Australia.
— *C. oryzae* Cav., Rev. Myc. **11**, 189. 1889; Sacc., Syll. **10**, 267. 1892; in foliis *Oryzae stativae* in Italia bor.
— *C. setariae* Atk., Bull. Cornell. Univ. **3**, 28. 1897; Sacc., Syll. **14**, 924. 1899; in culmis emortuis *Setariae* in Amer. bor.
— *C. cattanei* Fl. Tassi, Bull. Orto Bot. Siena, pag. 24. 1902; in foliis vaginisque *Oryzae sativae* in Italia bor.; ≡ *Sphaeropsis oryzae* (Catt.) Sacc., Syll. **3**, 302. 1884; ≡ *Phoma oryzae* Catt., Arch. Lab. Bot. Critt. Univ. Pavia **2—3**, 118. 1877.
— *C. arenarium* Bomm. Rouss. et Sacc. in Sacc., Ann. Myc. **3**, 509. 1905; Syll. **22**, 976. 1913; in culmis emortuis *Ammophilae arenariae* in Belgio.
— *C. graminum* Hollós, Ann. Mus. Nat. Hung. **5**, 53. 1907; Sacc., Syll. **22**, 976. 1913; in culmis *Phlei phleoidis* in Hungaria.
— *C. anomalum* Miyake, Journ. College Agricult. Tokyo **2**, 257. 1910; Sacc., Syll. **22**, 976. 1913; in foliis *Oryzae sativae* in Japonia.
— *C. zeae*, Stout, Mycol. **22**, 273. 1930; in foliis *Zeae maydis* in Amer. bor.
— *C. rechingeri* Pet., Ann. Naturh. Mus. Wien **50**, 484. 1939 (Publ. 1940); in foliis basin versus morientibus *Caricis* sp. in Persia.
— *C. stipaenum* Unam., An. Jard. Bot. Madr. **2**, 74. 1941 (Publ. 1942); in foliis putrescentibus *Stipae pennatae* in Hispania.
— *C. cereale* Müller ap. Zogg in Phytopath. Z. **18**, 11. 1951; in caulibus emortuis *Tritici vulgaris* in Helvetia.

Et autem:

C. tenue Died. (non Bub. v. in Capparidaceis), Kryptfl. Mark Brandenburg **9**, 567. 1914; Sacc., Syll. **25**, 257. 1931; in culmo sicco *Calamagrostis epigeios* in Germania, est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 352. 1927, verisimiliter *Ascochytella* cum conidiis unicellularibus, quamvis ut species valida descripta.

C. sporoboli I. Reichert, Engl. Bot. Jahrb. **56**, 713. 1921; in foliis

Sporoboli spicati in Africa bor., sec. Pet. et Syd., Ann. Myc. **22**, 325. 1924, est species delenda.

C. psammae Oud., Hedw. **37**, 177. 1898; Sacc., Syll. **16**, 911. 1902; in foliis *Ammophilae arenariae* in Hollandia, fide Pet. et Syd., Ann. Myc. **22**, 328. 1924, Oudemans descripsit hanc speciem in Herbario ut *C. ammophilae* quod est *Anthostomella ammophilae* (Phill. et Plowr.) Sacc.

C. stiparum Speg., An. Mus. Nac. Buenos Aires **8**, 82. 1902; Sacc., Syll. **18**, 308. 1906; in foliis vaginisque *Stipae quadrifoliae* in Amer. bor., sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 429. 1927 est *Hendersonia stiparum* (Speg.) Pet. et Syd., An. Myc. **23**, 250. 1925.

C. melasporum (Berk.) Sacc., Syll. **3**, 319. 1884; in culmis *Sacchari officinarum* in Australia ≡ *Darluca melaspora* Berk. ap. Cke., Nuovo Giorn. Bot. Ital. **10**, 26. 1878 ≡ *Diplodia melaspora* (Berk.) Delacr., Bull. Soc. Myc. France **13**, 113. 1897, est fide H. et P. Syd., Ann. Myc. **14**, 369. 1916, verisimiliter *Microsphaeropsis bakeri* Syd. l. c.; fide Pet. et Syd. in Fedde, Rep. Beih. **42**, 423. 1927, est contra *Microdiplodia melaspora* (Berk.) Pet. et Syd., Ann. Myc. **22**, 341. 1924.

C. bambusae Miyake et Hara, Bot. Mag. Tokyo **24**, 353. 1910; in *Bambusa* sp. (Sacc., Syll. **22**, 976. 1913) et in foliis *Phyllostachydis puberulae* (Sacc., Syll. **25**, 237. 1931) in Japonia, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 418. 1927, est species dubia.

C. arundinaceum Sacc., Mich. **1**, 203. 1878; Syll. **3**, 319. 1884; in culmis putrescentibus *Arundinis donacis* in Italia bor., est sec. Pet. et Syd. in Fedde, l. c. pag. 439, *Cytoplea arundinacea* (Sacc.) Pet. et Syd. l. c.

C. sacchari Prill. et Delacr., Bull. Soc. Myc. France **13**, 113. 1897; in *Saccharo officinarum* in Asia austr., sec. Pet. et Syd. in Fedde, l. c. pag. 455, est *Pleocyta sacchari* (Massee) Pet. et Syd. l. c.

C. andropogonis Gz. Frag., Mus. Barcin. Scient. Nat. Opera Ser. Bot. **2**, 126. 1917; Sacc., Syll. **25**, 237. 1931; in foliis languidis v. emortuis *Andropogonis hirti* in Hispania, sec. Pet. et Syd. in Fedde, l. c. pag. 418, est species delenda.

In Musaceis.

Pycnidiosporis 5 μ diam.:

C. gastonis (Roum.) Berl. et Vogl. in Sacc., Syll. Add. **1—4**, 324. 1886; Syll. **10**, 266. 1892; in foliis vivis *Musae sapientium* in Australia; ≡ *Phyllosticta gastonis* Roum., Rev. Myc. **8**, 19. 1886.

In Zingiberaceis.

C. alpiniaecolum Fl. Tassi, Bull. Lab. Orto Bot. Siena **2**, 152. 1899; Sacc., Syll. **16**, 911. 1902; in foliis vaginisque siccis *Alpiniae nutantis* in Italia centr., sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 417. 1927, est *Pestalotia* sp.

In Orchidaceis.

C. stanhopeae P. Henn., Hedw. **48**, 15. 1908; Sacc., Syll. **25**, 242. 1931; in foliis *Stanhopeae* sp. in Brasilia, est sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 429. 1927, species excludenda.

C. hariotianum Speg., Rev. Mus. de la Plata **15**, 36. 1908; Sacc., Syll. **22**, 975. 1913; ad folia languida *Oncidii* in Brasilia, est sec. Pet. et Syd., l. c. pag. 422, species excludenda.

In Palmis.

A. Pycnidiosporis elongatis 4—9 usque 12 × 2.5—4 usque 6 μ:

C. palmicolum (Fr. p. p.) Starb., Bih. K. Sv. Vet. Hdl. Stockolm **19**, 78. 1894; Sacc., Syll. **11**, 515. 1895; Woll. et Hpfl., Z. Parasitenkde **9**, 634. 1937 (ut *C. palmicola*); in foliis *Palmarum* in Nicobar nec *Cocos nuciferae* in Africa austr. (fide Cardoso, Bothalia **5**, 631. 1950) ≡ *Sphaeria palmicola* Fries pro minore parte, Syst. Mycol. **2**, 466. 1823; Sacc., Syll. **2**, 410. 1883.

Species includendae:

C. socium Pass. et Beltr., Trans. R. Accad. Lincei, Roma 3, **7**, 34—39. 1882; Sacc., Syll. **3**, 319. 1884; ad folia arida *Chamaeropsis humilis* in Sicilia.

C. chamaeropis Sacc. et Syd. in Sacc., Syll. **14**, 925. 1899; in foliis emortuis *Chamaeropis humilis* in Britannia nec non *Cocöes romanzoffianae* in Lusitania (da Camera, Bol. Agric. Lisboa **2**, ser. I, 41. 1936) ≡ *C. palmarum* Cke. et Mass. (non Cda.), Grev. **16**, 7. 1888. Fide Died., Ann. Myc. **11**, 47. 1913 *C. chamaeropsis* est syn. *Microdiplodiae palmarum* (Cda.) Died., ut etiam *C. palmarum* Cke. et Mass. (non Cda.).

C. batumense Siem., Acta Soc. Bot. Pol. **1**, 24. 1923, emendavit Pet. et Syd. in Fedde, Rep. Beih. **42**, 387. 1927; in foliis *Phoenicis canariensis* in Transcaucasia nec non *Cycadis revolutae* (v. Pet. et Syd. l. c.).

C. sabalidis da Camara, Bol. Agric. Lisboa **2**, ser. I, 41. 1936; sub cortice ramulorum *Sabalidis palmetto* in Lusitania.

C. arecae Padwick et Merh, Mycol. Papers no. 7, pag. 4 1943; in foliis vivis *Arecae catechu* in India.

AA. Pycnidiosporis sphaericis 3—3.5 μ diam.:

C. palmigenum Sacc., Syll. **25**, 242. 1931; in foliis languidis v. morientibus *Dictyospermae albae* in Asia austr. ≡ *Phyllosticta palmigena* Sacc., Bull. Orto Bot. Napoli pag. 17. 1918.

Species includenda:

C. concentricum (Desm.) Sacc. f. *chamaeropis* Gz. Frag., Mem. R. Ac. Cienc. Art. Barcelona **15**, 438. 1920; Sacc., Syll. **25**, 242. 1931; in petiolis emortuis *Chamaeropis humilis* in Hispania.

Observ.:

C. palmarum Cda. (non Cke. et Mass.), Icon. Fung. **4**, 38. 1840; Sacc., Syll. **3**, 318. 1884; in foliis languidis *Chamaeropis humilis* in Italia austr., Sicilia et Hispania, *Pandani reflexi* (Pandanaceae) in Italia bor. nec non in foliis *Phoenicis dactyliferae* in Lusitania, sec. Diedicke, Ann. Myc. **11**, 45. 1913 est *Microdiplodia passeriniana* (Thüm.) Allesch. ≡ *Diplodia passeriniana* Thüm., Fungi nonn. Ital. Novi 1867; sec. Woll. et Hpfl., Z. Parasitenkde. **9**, 635. 1937, est, cum *C. palmarum* Cda. f. *phoenicis-dactyliferae* Thüm., Myc. Univ. no. 1482 syn. *Microdiplodiae palmarum* (Cda.) Died., Ann. Myc. **11**, 47. 1913.

C. borbonicum Thüm., Inst. de Coimbra **27**, 44 (extr.). 1879; Sacc., Syll. **3**, 318. 1884; ad folia languida subviva *Lataniae borbonicae (Livistonae sinensis cult)* in Lusitania, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 419. 1927, est *Microdiplodia palmarum* (Cda.) Died.

C. cocoës P. Henn., Engl. Bot. Jahrb. **34**, 53. 1904; Sacc., Syll. **18**, 307. 1906; in foliis *Cocoës nuciferae* in Africa orient., sec. Pet. et Syd. in Fedde, l. c. pag. 312, est *Lasmaniella cocoës* (P. Henn.) Pet. et Syd. l. c.

Adest autem in Palmis pro parte: *C. olivaceum* Bon. (v. in Araliaceis), in foliis emortuis *Chamaeropis excelsae* in Tirolia (fide Bub., Ann. Myc. **14**, 152. 1916).

In Araceis.

Adest pro parte in Araceis: *C. boyeri* Fl. Tassi, ≡ *C. scirpi* (Boy. et Jacz.) Allesch. (non Trail) (v. in Cyperaceis).

C. aroideum Cke. et Mass., Grev. **15**, 11. 1887; Sacc., Syll. **10**, 266. 1862; in foliis *Colocasiae scandentis* in Africa, est sec. Pet. et Syd., Myc. **22**, 327. 1924, species excludenda.

In Pandanaceis.

Pycnidiosporis 4—9 plerumque 5—6 μ longis 2—3.5 μ latis:

C. pandanicolum Pet., Sydowia **7**, 401. 1953; in fructibus vivis *Pandani* cult. in Hawai.

Observ.:

Adest pro parte in Pandanaceis: *C. palmarum* Cda. (non Cke. et Mass.), (v. in Palmis); in foliis languidis *Pandani reflexi* in Italia bor.

In Typhaceis.

C. typhicolum (Fautr. et Lamb.) Fl. Tassi (pro errore *C. tiphicolum*); in foliis *Typhae latifoliae* in Gallia ≡ *Sphaeropsis typhicola* Fautr. et Lamb., Rev. Mycol. pag. 55. 1897; Sacc., Syll. **14**, 922. 1902, est, propter conidiorum magnitudinem, species excludenda.

In ligno putri, in ramis caulibusque siccis. et in cortice[1]).

Pycnidiosporis 4.1—6 (7) × 2—3 μ:

C. lignorum (Fr.) Sacc., Syll. **3**, 315. 1884; ≡ *Clisosporium lignorum* Fr., Syst. Myc. **3**, 335. 1832; in asseribus ligneis in Germania et Suecia[2]).

Species includendae:

C. papillatum (Schulz.) Sacc. et Trav., Syll. **19**, 400. 1910; Syll. **22**, 969. 1913; in ramis jam statu viventi decorticatis, in Hungaria ≡ *Clisosporium papillatum* Schulz., v. Mügg. in Verh. zool.-bot. Ges. Wien **13**, 1125. 1871.

C. aequivocum (Ces.) Sacc., Syll. **3**, 317. 1884; in caulibus exsiccatis Insula Borneo ≡ *Phoma aequivocum* Ces., Myc. Born. pag. 25. 1879.

C. coloratum (Peck) Sacc., Syll. **3**, 315. 1884; in ligno emortuo in Amer. bor. ≡ *Phoma colorata* Peck, Bot. Gaz. pag. 34. 1880.

C. paradenycum (Ces.) Sacc., Syll. **3**, 319. 1884; in culmo quodam lignatili decorticato in Insula Ceylon ≡ *Phoma arundinaceum* Ces., Myc. Born. pag. 25. 1879 (nec Sacc.).

Observ.:

Reperire non potuimus descriptionem huius speciei: *C. crescenticum* Dearness and House, Circ. N. Y. St. Mus. U.S.A. **24**, 47. 1940; in ligno emortuo et intemperibus subjecto, in Amer. bor.

C. myriocarpum (Fr.) Sacc., Syll. **3**, 315. 1884; in lignis ad terram dejectis in Suecia, Germania, Gallia ≡ *Sphaeria myriocarpa* Fr., Syst. Myc. **2**, 459. 1823, sec. Pet. et Syd., in Ann. Myc. **22**, 330. 1924 et in Fedde, Rep. Beih. **42**, 425. 1927, est, *Trichosphaeria myriocarpa* (Fr.) Pet. et Syd., Ann. Myc. l. c.

C. maculans (Peck) Fl. Tassi, Bull. Orto Bot. Siena **5**, 24. 1902; in ramis emortuis in Amer. bor. ≡ *Sphaeropsis maculans* Peck, 39 Rep. pag. 46. 1886; Sacc., Syll. **10**, 257. 1892, est, propter conidiorum magnitudinem, species excludenda.

C. corticalis (Kalch. et Cke.) Fl. Tassi, Bull. Orto Bot. Siena **5**, 24. 1902; in cortice in Africa austr. ≡ *Sphaeropsis corticalis* (Kalch.

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[1]) Sub hac distributione sunt *Coniothyrii* species illae in ligno, ramis, etc. quae non habent matricem referendam ad species vegetales declaratas, sed ubi haec sunt designata vide in Familiis singulis, ad exemplum in Pinaceis, Fagaceis, Juglandaceis, etc.

[2]) Sec. Woll. et Hpfl., Z. Parasitenkde. **9**, 634. 1937, *C. lignorum* (Fr.) Sacc. adest etiam: „ad lignum trunci *Ulmi* necatae discoloratum, in Germania; in sarmentis aridis pendulis *Aceris negundinis*, in Germania; ad corticem axis putridae arboris junioris *Piri mali*, in Germania; ? in ram. decorticatis *Broussonetiae papyriferae* et *Fici caricae* (propter syn. *C. anserinum* Sacc. v. in Moraceis et Urticaceis); ? in rad. emort. *Parietariae officinalis* (propter syn. *C. parietariae* Sacc., v. in Urticaceis) in Italia; ? in ramis decort. *Sambuci nigrae* (propter syn. *C. fuscidulum* Sacc., v. in Caprifoliaceis) in Europa."

et Cke.) Sacc., Syll. **3**, 302. 1884, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 24. 1927, est syn. *Sphaeropsidis corticalis* etiam excludendae.

C. obscurum Pass. in Martelli, Florula Bogosensis pag. 148. 1886; Sacc., Syll. Add. **1—4**, 322. 1886; Syll. **10**, 268. 1892 est, sec. Pet. et Syd. in Ann. Myc. **22**, 321. 1924 et in Fedde, l. c. pag. 426, *Microdiplodia obscura* (Pass.) Pet. et Syd., Ann. Myc. l. c.

C. rubellum Cke., Grev. **8**, 117. 1880; Sacc., Syll. **3**, 315. 1884; in ligno decorticato in Amer. bor, est sec. Pet. et Syd. in Fedde l. c. pag. 428, species excludenda.

C. subtile Cda., I c Fung. **4**, 38. 1840, sub *Aposphaeria subtilis* (Cda.) Sacc. in Syll. **3**, 177. 1884; in ligno ramorum emortuorum arborum frondosarum in Bohemia, est, sec. Woll. et Hpfl. in Z. Parasitenkde. **9**, 601. 1937, *Phoma seriata* (Pers.) Woll. et Hpfl., Z. Parasitenkde **8**, 579. 1936.

In resina.

C. resinae Sacc. et Berl., Atti R. Ist. Veneto Sc. Lett. ed Art. **6**, ser. 3; 739. 1885; Sacc., Syll. Add. **1—4**, 324. 1886 et Syll. **10**, 269. 1892, est, sec. Pet. et Syd. in Fedde, Rep. Beih. **42**, 436. 1927, syn *Lichenoconii resinae* (Sacc. et Berl.) Pet. et Syd.

In stercore.

Pycnidiosporis 6—7 × 4—6 μ:

C. coprophilum Speg., An. Soc. Ci. Arg. **10**, 155. 1880; Sacc., Syll. **3**, 319. 1884; in stercore canino putrescente in Argentina.

In ovis.

Pycnidiosporis 5.5—7.5 × 3—4.5 μ:

C. gregori Příhoda, Ceskà Myk. **8**, 168. 1954; in silvis quercinis ad ovula *Tortricis viridanae* in Moravia austr.

In ossibus.

C. ossis (Preuss) Jacz., Monogr. du Genre Sphaeronema pag. 88. 1898; Sacc., Syll. **16**, 912. 1902 in ossibus putrescentibus in Germania ≡ *Sphaeronema ossis* Preuss, Linnaea **26**, 711. 1853; Sacc., Syll. **3**, 198. 1884, est, propter descriptionem sine conidiorum dimensionibus, species excludenda.

Summary.

A classification of the genus *Coniotyrium*, taking in consideration the morphology of the species according the families of the host plant is proposed. It is admitted that this classification is artificial.

Of about 477 binomials 130 species were considered (including 16 new combination) and 125 species (and 18 varieties) included in the revision.

Notes on the Mucorales of Indonesia.

By K. B. Boedijn*) (s'Gravenhage, Netherlands).

With 12 textfigures.

Introduction.

On the *Mucorales* of Indonesia only a restricted number of papers has been published. Van Overeem (84) in his list of the Fungi of this region mentions the following 9 species;

Amylomyces Rouxii Eykman
Mucor dubius Wehmer
Mucor javanicus Wehmer
Mucor Mucedo L.
Chlamydomucor Oryzae Went et Prinsen Geerlings
Rhizopus Artocarpi Rac.
Rhizopus nigricans Ehrenb.
Rhizopus Oryzae Went et Prinsen Geerlings
Syncephalastrum javanicum Rac.

From these species *Amylomyces Rouxii* Eykman (non *Amylomyces Rouxii* Calmette) and *Chlamydomucor Oryzae* Went. et Prinsen Geerlings are the same species and this is also true for *Mucor dubius* Wehmer and *Mucor javanicus* Wehmer. The records of *Circinella spinosa* Van Tieghem et Le Monnier and *Syncephalis bispora* Rac. have been forgotten in the above mentioned list.

Up to the present I am now able to list 55 species as occurring in Indonesia, most of which were collected on the island of Java. However it is probable, that nearly all of them may be found over the whole Archipelago. From my records it is once more evident, that the majority of the *Mucorales* are of world-wide distribution. Furthermore descriptions or notes are furnished for most species, especially the critical ones, as the existing diagnoses are often too short or too vague.

Synonyms are only mentioned when used for the first time. In studying the *Mucorales* it soon becomes manifest, that the variations in spore-shape and size are far greater than in other Fungi; reaching its culmination in such species as *Mucor inaequisporus* Dade. In other species we find alongside the normal spores a small number of very large ones as f. i. in *Cunninghamella echinulata* (Matruchot) Thaxter, where those large spores are called "conidies tardives" by Ling

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Young (68, 69) to distinguish them from the "conidies proprement dites". This phenomenon that very large spores are found in a species with normally much smaller ones, was discovered to occur also in some other genera except *Cunninghamella.*

Concerning the literature, I have with the exception of some papers, which I had to mention in the text, listed only those articles, which were published after 1934, because in Zycha (101) most of the publications on the *Mucorales* up till that date are to be found.

The author takes the opportunity to express his gratitude and indebtedness to his former assistent Mrs. Sri Sabani for her lasting activity in collecting material, to Miss Dr. J. Ruinen for the presentation of some cultures of soil fungi, to Prof. Dr. Ir. Tojib Hadiwidjaja for cultivating and confronting the different strains of *Blakeslea trispora* and to Dr. H. C. D. De Wit for his help with the latin diagnoses.

Under the heading of the different families I have also added the genera not found in Indonesia.

Mucoraceae.

Mucor, Zygorhynchus, Actinomucor, Circinella, Pirella, Rhizopus, Rhizopodopsis, Absidia, Phycomyces, Spinellus, Parasitella, Syzygites, Sporodiniella.

The genus *Saksenaea* placed by Hesseltine (51) in the *Mucoraceae* seems so aberrant, that it may probably be better to accomodate it into a separate family.

Mucor.

Mucor pusillus Lind Arch. exp. Path. u. Pharm. **21**. 272. 1886.

Colonies 1—3 mm high, at first pale later greyish brown about Drab Ridgway. Sporangiophores strongly branched at first subhyaline later pale brown, often with a crosswall near the sporangia; 2½—15 μ in diam. Sporangia globose, dark, varying much in dimensions, 16—60 μ in diam. Very small ones on the short thin side branches. Columella globose, oval till egg-shaped, subhyaline till pale brownish, with mostly a very low collar at the base; 10—51 × 10—41 μ; the very small ones 8—9 μ in diam. Spores dirty brown in mass, singly subhyaline globose till oval 3—4½ μ in diam.

Java, Djakarta, as a contaminant in a yeast culture.

Mucor plumbeus Bonorden, Abh. Naturf. Ges. Halle **8**. 109. 1864.

Verlaten eiland (one of the isles of the Krakatau group) isolated from soil by D. Feher. No other collections of this species were made.

Mucor globosus Fischer in Rabenhorst Krypt. Flora **1**. 202. 1892.

Colonies 2 cm or more high, of a very pale yellowish color, about cartridge buff till cream buff Ridgway. Sporangiophores branched 7—33 μ in diam. occasionally with a crosswall. Sporangia globose, dark colored, 60—125 μ in diam. Columella globose till oval, subhyaline, sometimes with a low collar at the base; 54—60 μ in diam. or 90—104 × 75—80 μ. Spores subhyaline, globose till subglobose 3½—7 μ in diam. Chlamydospores intercallary in the hyphae, mostly cylindrical, with granular contents, 50—85 × 18—29 μ.

Java, Bogor, isolated from soil.

Mucor racemosus Fres. Beitr. z. Mycologie 12. 1850.

Verlaten eiland, isolated from the soil by D. Feher. — Java, Bogor, isolated from the soil.

Mucor javanicus Wehmer, Zentralbl. f. Bakt. etc. Abt. II, **6**. 610. 1900.

Colonies 1—2½ cm high, silvery grey in color. Sporangiophores strongly branched, often with septae in the main thread above the side branches. Main hyphae 14—27 μ in diam. side branches 3—10 μ in diam. Sporangia globose, dark greenish till black, very variable in dimensions, 14—100 μ in diam. Sporangial-wall very delicately spinulose, soon diffluent. Columella colorless till faintly brownish, with very distinct bent down collar at the base; globose till oval, sometimes subpyriform 7—51 μ in diam. or 34—81 × 24—68 μ. Spores dirty yellowish in mass, singly subhyaline, variable as to shape and dimensions, subglobose, oval till elliptic, 3½—7 μ in diam. or 4—8½ × 3½—5 μ. Chlamydospores mostly intercalary, colorless or pale yellowish, wall hardly thickened, cylindric 17—51 × 14—17 μ.

Java, Bogor, on chicken dung, on rotting seeds of *Mucuna*.

Mucor circinelloides V. Tieghem, Ann. Sc. Nat. 6 sér. **1**. 94. 1875.

Colonies pale grey ½—1 cm high. Sporangiophores sympodially branched colorless, mostly with a crosswall just above a side branch. Main threads 10—27 μ in diam. side branches 2½—7 μ in diam. Those branches often with a finely granulated wall and usually bent. Sporangia globose, erect on the large threads, mostly nodding on the side branches at first pale yellow, at maturity dark murky yellow; wall with very delicate spines; 14—99 μ in diam. Columella globose till oval, with distinct collar at the base, 14—58 μ in diam. Spores rather regular elliptic, colorless 6—7½ × 4—5 μ. Chlamydospores not frequent, mostly intercalary, colorless till pale yellow with slightly thickened wall, globose, oval till cylindric, isolated or sometimes in chains, 10—24 μ in diam. or 14—27 × 7—17 μ.

Java, Bogor, on rabbit dung. Isolated from the leaves of Butea.

Bobr-Tylingo (15) mentions our species from Madagascar. However the accompanying description, which f. i. states that the spores are angular does not fit *Mucor circinelloides* at all. Most probably we have to deal here with another perhaps a new species.

Mucor hiemalis Wehmer. Ann. Mycol. **1**. 39. 1903.

Colonies pale grey, about pale olive buff till olive buff Ridgway or white with a yellowish hue according to the strain; up till 2 cm high. Sporangiophores simple at first, afterwards more or less sympodially branched. Main threads often with a crosswall above the side branches. Wall often finely granulated; contents sometimes with yellow oil, 5—17 μ in diam. Sporangia dark, globose 22—130 μ usually 58—72 μ in diam. Columella globose, short cylindric, sometimes suboviform, often with more or less truncated base, with a distinct collar 7—55 μ in diam. or 20—44 × 17—27 μ. Spores elliptic, very variable in shape and dimensions, brownish in mass, singly hyaline 2½—8 × 1½—3½ μ. Chlamydospores especially in old cultures, yellowish in color, isolated or in short chains, globose or elongated 9—32 μ in diam. or 10—36 × 6—18 μ. Wall 1—2½ μ thick. Zygospores dark brown, covered by pyramidal warts, 51—88 μ in diam. Suspensors often unequal, short, hardly swollen.

Java, Bogor, very common. Isolated from soil, fructifications of *Hirneola delicata,* bread, rubber sheets, potatoes, dung from *Paradoxurus hermaphroditus.*

Mucor inaequisporus Dade. Transact. Brit. Mycol. Soc. **21**. 51. 1937.

Colonies up till 2 cm or more high, yellowish or orange yellow, about buff yellow, orange buff, light orange yellow Ridgway, in some strains with a greenish hue. Sporangiophores at first unbranched, later sparingly branched, with yellowish or orange droplets, later hyaline and with some septae, 14—58 μ in diam. the side branches 4—20 μ in diam. Sporangia dark brown, about buffy olive Ridgway, globose 29—290 μ in diam. Sporangial wall delicately spinulose, soon diffluent. Columella pyriform till subgobose, sometimes with distinct constriction near the base; with a collar and usually an orange colored contents; variable in dimensions 17—153 × 14—119 μ. Spores extremely variable as to shape and dimensions, yellowish till orange in mass, singly hyaline till pale yellowish, the smallest elliptic or oval, the intermediate types elliptic or broadly elliptic, the largest ones globose till subglobose. The small and intermediate spores 4—24 × 2½—14 μ the large spores 14—27 μ in diam. Chlamydospores not found. Zygospores on the mycelium, globose, at first brown, later opaque blackish brown 37—61 μ in diam. covered by irregular shaped warts 3—7 μ in diam.

Java, Bogor, on fruits of *Artocarpus glaucus, Flacourtia inermis, Musa paradisiaca, Diospyros Kaki, Bouea macrophylla.*

Mucor Mucedo Fres. Beitr. z. Mycologie 7. 1850.

This species is rather common on dung of herbivores. Typical are the regular, cylindric spores 11—19 × 5½—11 μ.

Sumatra, Medan, between grass on indeterminable organic material. — Krakatau isles, isolated from soil by D. Feher. — Java, Bogor, on dung of cows and horses.

Mucor albo ater Naumov. Petersb. Pilze 1915.

Colonies several cm high, whitish. Sporangiophores unbranched, 17½—85 μ in diam. Sporangia dark, globose up till 350 μ in diam. Columella typical cylindric, seldom pyriform, with a small collar at the base 80—285 × 42—135 μ. Spores oblong, colorless 8—14 × 5½—9½ μ.

Verlaten eiland (Krakatau group) on rotten fruit of *Carica Papaya*. Java, Tjibodas on dunged soil, Bogor on excrements of *Paradoxurus hermaphroditus*.

Circinella.

Circinella muscae (Sorokine) Berlese et De Toni in Saccardo Syll. Fung. **7**. 216. 1888.

Colonies 2 mm till 2 cm high, grey, about between drab and hair-brown Ridgway. Sporangiophores erect, 14—34 μ in diam. at first hyaline later pale brownish, often undulating, ending either sterile or with a sporangium. At rather regular intervals short lateral branches are formed on the mainthread. Those side branches 85—122 × 10—20 μ ending with a blunt tip. Near the base of those branches an usually strongly incurved side branch 7—17 μ in diam. and bearing a sporangium is originating. The sterile branch provided with a cross-wall. Sometimes the sporangia bearing threads are originating directly from the mainthread or both branches are ending with a sporangium. Later septae are also formed in the sporangia bearing threads. Sporangia globose dark, nearly black, 29—145 μ in diam. Sporangial wall subhyaline finely granulated, fragmentating. Columella grey, mostly cylindric, often more or less strongly constricted in the middle. At the rounded top often provided with some short appendages or delicate spines. Very small columellae sometimes strongly attenuated near the tip; 20—85 × 10—61 μ appendages 2—3 μ long. Spores globose till subglobose, dirty brown in mass, singly subhyaline 5—7 μ in diam.

Java, Bogor, on dung, isolated from soil and from the bark of *Murraya paniculata*.

In a culture of this species a sector appeared, where instead of sporangia, empty vesicles were formed, which often proliferated to produce new threads with vesicles.

Circinella mucoroides Saito Zentralbl. f. Bakt. etc. Abt. II, 17. 159. 1907 seems hardly distinct from the above mentioned species and may be considered a synonym.

Circinella umbellata v. Tieghem et Le Monnier, Ann. Sc. Nat. 5 sér. **17**. 300. 1873.

Colonies 1 till several cm high, pale grey in color. Sporangiophores erect not bearing a terminal sporangium, at first hyaline afterwards pale brown, 10—30 μ in diam. On short, sometimes more or less swollen side branches 17—34 μ in diam. 1 till 10 mostly 6 till 8 short strongly incurved sporangiophores are originating, with granulated walls 7—14 μ in diam. Sporangia globose, grey 30—109 μ in diam. with granulated fragmenting sporangial wall, Columella very variable in shape and dimensions, hyaline till pale brown, cylindric, obovate, sometimes weakly constricted in the middle or subpyriform, tip smooth or provided with a few appendages 24—68 × 17—47 μ. Spores hyaline, glistening, globose or subglobose 4—10 μ in diam.

Java, Bogor, on dung, especially of rabbits. In Bogor nearly every batch of rabbit dung yields this species.

In one collection a number of sporangia was found with much larger spores. The sporangia about 90 μ in diam. the spores globose till elongated 9—18 μ in long axis. This form agrees with *Circinella umbellata* var. *Moreliae* Berk. et Br. Transact. Linn. Soc. **83**. 406. 1878. As in several of the *Mucorales* occasionally very large spores may be found, a separate name for such forms seems superfluous.

Rhizopus.

Rhizopus oligosporus Saito Zentralbl. f. Bakt. etc. Abt. II, **14**, 624. 1905.

Colonies pale brownish grey, 1 mm or more high. Mycelium creeping, colorless, the separate threads 2—12 μ in diam. On the trailing hyphae the sporangiophores are arising, borne in fascicles of 2 till 6. Under those fascicles short rhizoids are to be found. Sporangiophores subhyaline till brown, becoming colorless near the top; often incrustated with delicate crystals, 5—22 μ in diam. Sporangia globose dark 50—102 μ in diam. Columella globose till short cylindrical, hyaline with very low collar and a broad funnel-shaped apophyse; 14—73 μ in diam. or 15—78 × 12—73 μ. Spores brownish grey in mass singly subhyaline till very pale greyish, smooth, subangular, very irregular as to shape and dimensions, globose, oval, broad elliptic, elongated and many irregular shapes with undulating outline or sometimes even furcated; 5—7 μ in diam. or 7—24 × 6—10 μ. Most common dimensions 7—12 × 6—9 μ. The aberrant spores much larger. Chlamydospores abundant, colorless, produced everywhere in the mycelium, sporangiophores and even in the sporangia, suppressing the formation of sporangiospores partly

or entirely. In the hyphae they are singly or in short rows. Shape and dimensions very variable; globose, elliptic citriform, cylindric. When formed opposite a side branch, often with a short appendage. Wall slightly thickened in old specimens, contents coarse granular, mostly with oildrops, 7—30 μ in diam. or 12—43 × 7—34 μ Wall up till 1½ μ thick.

Java, In Bogor this mold can always be isolated from "tempeh", cakes made from the seeds of *Soja Max* (*Glycine max*). Also isolated from "Bungkil" (cattle cakes) and fermenting tobacco.

A very typical species, well characterised by its smooth spores, with many bizarre aberrations and the fact that soon the formation of sporangiospores is much reduced and replaced by abundant chlamydospores.

Rhizopus Cohnii Berlese et De Toni in Saccardo Syll. Fung. **7**. 213. 1888.

Colonies up till about 1 cm high, pale grey in color, dotted by the dark sporangia or darker and about deep grayish olive Ridgway. Sporangiophores sometimes single but mostly in fascicles of 2—6, usually 2—3, often sprouting from a short trunklike base 14—17 μ broad from the underside of which the rhizoids 3—7 μ broad are originating. Occasionally brown colored vesicles 27—68 μ in diam. sometimes incrustated with needle-like crystals are formed in the hyphae. From those vesicles 2 till more sporangiophores are arising. Sporangiophores subhyaline till brownish 4—25 μ broad; usually 10—14 μ in diam. Sporangia globose, dark 17—240 μ mostly 87—100 μ in diam. Sporangial wall covered by fine needle-like crystals. Columella subhyaline till pale brown, usualy semiglobose but also globose till oval, with a broad apophyse and often an indication of a collar; 10—173 μ in diam. Spores globose, subglobose till oval, subangular, grey, striate, the striae representing low, white sparingly anastomosing ribs; 3½—10 μ in diam. or 5—10 × 3½—7 μ. Chlamydospores very abundant mostly singly, intercalary in the mycelium, but also in the sporangiophores and in the sporangia; usually globose or subglobose but also oval, oviform till cylindric; wall only slightly thickened, contents granular, 14—41 μ in diam. or 18—46 × 10—27 μ.

Sumatra, Kampong Baru, on rotten seeds of *Indigofera endecaphylla*. — Java, Bogor, Isolated from tomato, seeds of *Arachis hypogaea* and old paper.

A very large number of *Rhizopus* species has been described, which are showing nearly the same morphology as the above mentioned species, including also the well known *Rhizopus arrhizus* Fischer in Rabenhorst Kryptog. Flora **1**. 233. 1892 and *Rhizopus Oryzae* Went et Prinsen Geerlings Kon. Akad. Wetensch. Amsterdam **4**. 16. 1895. Most of those forms are distinguished chiefly on physio-

logical characters. But as the classification of Fungi is based on morphology they can hardly be considered to represent different species, but only strains of one very variable species. So we have to look for the oldest name, which is *R. Cohnii* and it seems therefore advisable that all those forms exhibiting nearly the same morphology have to be assembled under this name.

Rhizopus stolonifer (Ehrenb.) Lind Danish Fungi 72. 1913.

This very common species has fascicles of 2—7, usually 3—4 sporangiophores up till 4 mm high. The grey spores 7—18 × 5—11 μ are very clearly provided with low anastomosing white ribs. Chlamydospores never observed.

Sumatra, Kampong Baru near Medan, on seeds of the oilpalm, *Elaeis guineensis;* on decomposing casein. — Java, everywhere, especially on decaying fruits.

Rhizopus Artocarpi (Berk. et Br.) Boedijn nov. comb.

Mucor Artocarpi Berk. et Br. Journ. Linn. Soc. **14**. 137. 1873.

Rhizopus Artocarpi Raciborski Par. Alg. u. Pilze Javas **1**. 11. 1900.

Colonies brownish grey, up till ½ cm high. The sporangiophores often not so clearly fasciculated as in R. stolonifer; brown, wall often finely granulated; at the base sometimes with crosswall, 10—47 μ in diam. sometimes branched, each branch ending in a sporangium. Sporangia globose, dull black, 72—290 μ in diam. Most common dimensions 217—232 μ. Columella subhyaline till brown, semiglobose till cylindric, apophyse funnel-shaped, collar as a distinct line, 27—221 × 27—204 μ. Spores subangular, grey with low anastomosing white ribs; very variable as to shape and dimensions; globose till elongated, 7—17 μ in diam. or 14—20 × 10—14 μ. Chlamydospores not frequent, intercalary in the mycelium, cylindric with slightly thickened wall and granular contents 41—64 × 14—20 μ. Zygospores globose till subglobose, blackish brown wall coarsely warted 125—280 μ in diam. Suspensors swollen 126—184 μ in diam. at the broadest place.

Java, Very common on the male inflorescences of *Artocarpus* species, often covering them wholly with a blackish felt.

Rhizopus megasporus Boedijn nov. spec. (Fig. 1).

Coloniae 5 mm altae, colore sordide albidae. Sporangiophorae dilute brunneae, 10—17 μ in diam. 2—5, plerumque 2—3 ad marginem, fasciculatum supra truncum 20—27 μ diam. geruntur. Rhizoideae 10 μ diam. Sporangia globosa in maturitate obscura, 37—153 μ diam. Columellae semiglobosae 29—81 μ longae. Sporae subhyalinae vel griseae, globosae vel elongatae subpolygoniae, vix striatae 5—7 μ diam. vel 5½—10 × 5—7 μ.

Chlamydosporae copiosae, globosae, cylindraceae, plerumque ampullaceae vel lageniformes; 10—61 μ diam. vel 24—95 × 14—54 μ, tunica 1½—3 μ diam.

Colonies up till 5 mm high, dirty white of color with much aerial mycelium. Sporangiophores in fascicles of 2—5, mostly 2—3, especially near the border of the colony. Rhizoids under the fascicles up till 10 μ diam. Sporangiophores pale brown, 10—17 μ diam. originating from a short stemlike base 20—27 μ in diam. Sporangia globose, dark 37—153 μ in diam. Columella more or less

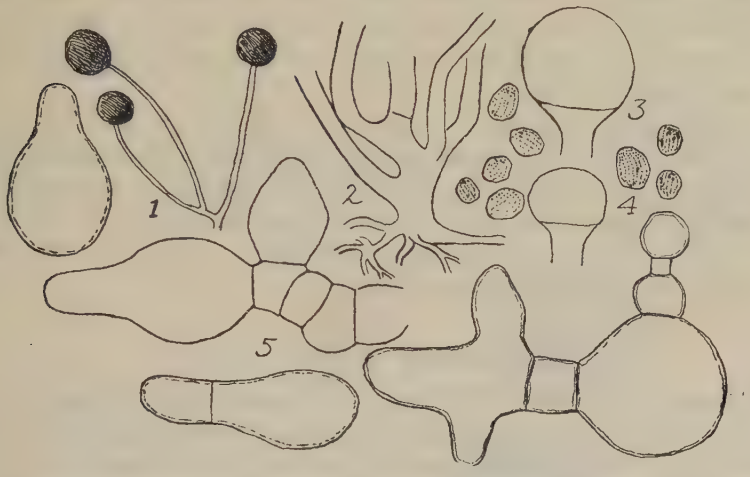

Fig. 1. *Rhizopus megasporus.* — 1. fascicle of sporangia. 2. base of such a fascicle. 3. columellae. 4. Sporangiospores. 5. Chlamydospores.

semiglobose 29—81 μ in long axis. Spores subhyaline till pale grey, globose till elongated, subangular, very indistinctly ribbed, 5—7 μ in diam. or 5½—10 × 5—7 μ. Chlamydospores in the mycelium exceedingly abundant, nearly always in long often branched chains, as whole mycelial threads including the branches are transformed into chlamydospores; Globose, cylindric often one side attenuated or club-shaped till flask-shaped. Wall thickened, contents granular, 10—61 μ in diam. or 24—95 × 14—54 μ, wall 1½—3 μ thick.

Java, Malang, isolated from soil.

This species, which is related to the *Rhizopus Cohnii* group, may be easily distinguished from members of that group by its nearly smooth sporangiospores and its peculiar shaped chlamydospores.

Rhizopus chlamydosporus Boedijn nov. nom.

Amylomyces Rouxii Eykman Centralbl. f. Bakt. etc. **16**. 97. 1894.

Chlamydomucor Oryzae Went et Prinsen Geerlings Verh. Kon. Akad. Wetensch. Amsterdam **4**. 14. 1895.

Colonies up till 4 mm high, of a dirty white color. Mycelium richly developed. Only a very few fascicles of 2—3 abortive brown colored sporangiophores may be found. They are 11—23 μ in diam. bearing at the top an empty vesicle 46—103 μ in diam. Afterwards practically the whole mycelium is transformed into chlamydospores, either singly or in chains. They are exceedingly variable as to shape and dimensions globose, elliptic till cylindric. The cellwall increasing in thickness with age, becoming very thick in old specimens; 9—44 μ in diam. or 21—77 × 13—39 μ. Wall 1—10½ μ thick.

Java, Bogor, isolated from "ragi", cakes of rice-flour often mixed with parts of aromatic plants, which are allowed to become mouldy whereupon they are dried and serve afterwards for the fabrication of alcoholic beverages.

The presence of a few fascicles of abortive sporangiophores clearly demonstrates, that we have to deal with a *Rhizopus* species. Typical are the chlamydospores, which at maturity are very thick-walled, a character not found in any of the *Mucorales*. Therefore we have to deal with a distinct species and not a strain of the *R. Cohnii* series as proposed by some authors.

Rhizopodopsis Boedijn nov. gen.

Mycelium repens. Hyphae fertiles erectae, ramosae vel non ramosae apice hyphis sporangiferis umbellatim positis terminatae. Columellae apophysatae, sporae globosae vel elongatae, pallide griseae, paululum asperulatae. Zygosporae nigrae, verrucosae.

Vegetative mycelium creeping. Sporangiophores erect, high, branched or unbranched; all ending in an umbell of spreading branches, in the middle of which the mainstem ends as a short appendage. The branches of the umbel all ending in sporangia. Columella large with apophyse by drought collapsing in the shape of a toadstool. Spores subhyaline till pale grey, globose till elongated, with finely granulated cell wall. Zygospores formed on the creeping mycelium, black with coarse pyramidal warts.

This genus is nearly related to *Rhizopus*. It differs from this genus chiefly in its mode of growth; for the sporangiophores are borne directly on the long erect branches, whereas in *Rhizopus* they originate in groups on long creeping stolones. The fact that our form in contact with some object may form rhizoids at the top of the mainstem instead of an umbel of sporangia is a further proof for the said relationship. One may compare the long erect mainstem of our form directly with the creeping stolones and the umbel of sporangia with the fascicles of sporangia in *Rhizopus*. Also the ornamentation of the spore wall is different.

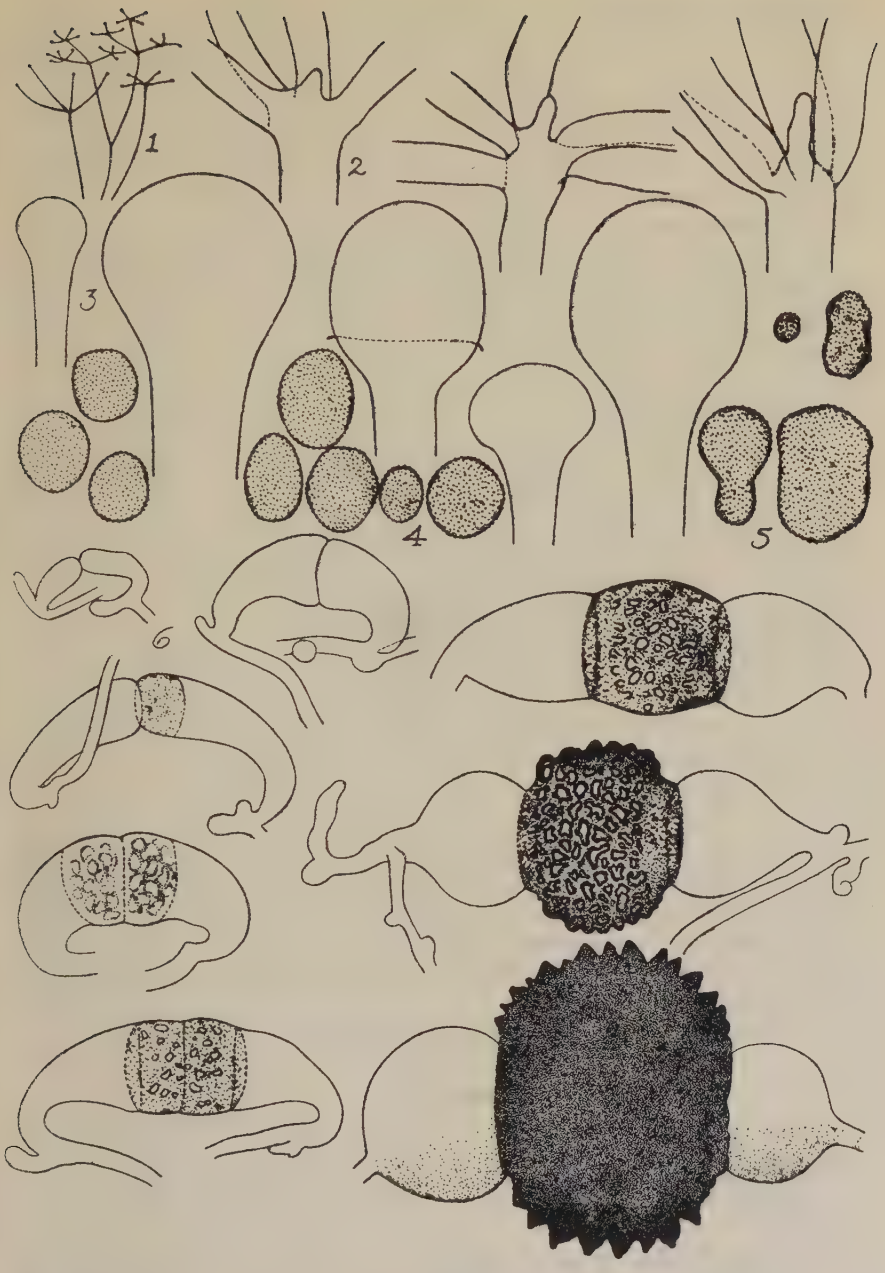

Fig. 2. *Rhizopodopsis javensis.* — 1. Habitus semidiagrammatic. 2. Centre of an umbel to show the tip of the main stem. 3. columellae. 4. sporangiospores. 5. aberrant sporangiospores. 6. stages in the formation of zygospores.

Rhizopodopsis javensis Boedijn nov. spec. (Fig. 2).

Coloniae 2—4 cm altae, pallide griseae. Sporangiophorae hyalinae plerumque ramosae 19—58 μ diam. apice hyphis sporangiferis 24—26 μ diam. umbellatim positis terminatae. Sporangia globosa, obscura 103—240 μ diam. Columellae subhyalinae vel griseae, globosae vel elongatae 77—144 × 91—125 μ, Sporae subhyalinae minutissime asperulatae, globosae vel elongatae 9½—30 μ diam. vel 23—42 × 15—30 μ. Zygosporae nigrae, verrucosae 122—210 μ diam.

Colonies 2—4 cm high, of a very pale shining grey color. Sporangiophores erect, colorless, wall often finely granulated, unbranched or more often branched. Each branch ending in an umbel of 2—6 sporangia bearing branches, or sometimes those branches of the umbel bearing secondary umbels. The supporting hyphae always ending as a short appendage 8—50 × 3—16 μ in the middle of the umbel. Mainthreads 19—58 μ broad, wall 2—3½ μ thick; branches of the umbel 24—26 μ broad. All threads attenuated near the base and broadened at the place of branching. The mainstem in those places 48—84 μ broad. Sporangia globose, dark colored 103—240 μ in diam. with smooth fugacious wall; which after deliquescense sometimes forms a small collar, but mostly disappearing entirely. Columella subhyaline till pale bluish grey, varying much in shape; globose, oval, short, cylindric, sometimes flattened and then broader than high; 77—144 × 91—125 μ. By drought collapsing and taking the shape of a toadstool. Apophyse funnel-shaped. Spores subhyaline till very pale grey, extremely variable as to shape and dimensions; globose, broad elliptical or elongated, all subangulate and sporewall finely granulated; 9½—30 μ in diam. or 23—42 × 15—30 μ. Moreover some very aberrant or misshapen spores may be found. Zygospores formed on the substratum on creeping mycelial threads about 14 μ in diam. Suspensors subhyaline till pale brown, strongly swollen 68—91 μ in diam. Zygospores subglobose, at first pale colored afterwards opaque black; wall with coarse conical warts; 122—210 μ in diam. Warts 10—16 μ high.

Java, Tjibodas, on fallen fruits of *Elaeagnus* spec.

Absidia.

Absidia corymbifera (Cohn) Sacc. et Trotter, Syll. Fung. **21**. 825. 1912.

Absidia Lichtheimi (Lucet et Costantin) Lendner Muc. Suisse 143. 1908.

Colonies 1 cm or more high, grey about olive gray Ridgway. Mycelium forming branched arching stolones, 7—20 μ in diam. mostly sympodially branched near the tips or bearing some whorls of sporangiophores 3—7 μ in diam. Sporangia globose, rather pale colored 30—80 μ in diam. Columella very variable as to shape and

dimensions, with or without an indistinct collar; the large ones semi-globose with funnel-shaped apophyse, the smaller ones cylindric till conical, sometimes provided with one or a few short, blunt protuberances, 7—59 μ broad. Spores colorless, oval 3—5½ × 2½—4 μ. No chlamydospores found.

Java, Bogor, on dung, isolated from soil, on decaying seeds of *Phaseolus radiatus.*

Absidia ramosa (Lind) Lendner Muc. Suisse 144. 1908.

Colonies white, afterwards grey, about 1 cm high. Sporangiophores borne on long arching and branching threads 3—17 μ in diam. They are on the end of those threads in whorls of 2—4; along the bent

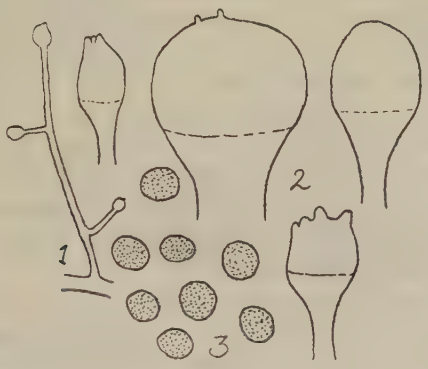

Fig. 3. *Absidia merdaria.* — 1. Side branch. 2. Columellae. 3. sporangiospores.

threads single sometimes with branched stalk. Often the stolon-like hyphae forming fascicles of rhizoids where they touch the substratum. Sporangia dark grey till black, subglobose 14—87 μ in diam. Columella grey in color variable as to shape and dimensions, mostly subglobose sometimes somewhat elongated, in the small specimens subconical 10—58 μ broad. Apophyse funnel-shaped, grey colored, the color also later in the upperpart of the sporangiophore. Spores colorless, regular, cylindric 2½—5 × 2—2½.

Sumatra, Kampong Baru, as contaminant in a culture of *Monilia sitophila.* Java, Bogor on dung.

Absidia cristata Dade Transact. Brit. Mycol. Soc. **21** : 26. 1937.

Colonies at first pale grey, afterwards grey about olive gray till deep olive gray Ridgway; up till 1 cm high. Main threads bending, branched, occasionally with a septum, 7—24 μ in diam. bearing the sporangiophores 3—10 μ in diam. Sometimes the sporangiophores in whorls of 2—6. Sporangia globose, black, 10—90 μ in diam. Sporangial wall smooth, diffluent, leaving a distinict collar at the base of the columella. Columella grey till pale brown, with apophyse, globose,

oval, cylindric till conical; the smaller specimens often with papillae or short, broad outgrowths; 14—68 × 7—65 μ. Spores globose, slightly subangular, greyish brown, dark in mass, with a suggestion of a punctation, only visible with a high power lens, 3—7 μ in diam.

Java, Bogor, isolated from soil and mouldy paper.

Absidia merdaria Boedijn nov. spec. (Fig. 3).

Coloniae ad 5 mm altae, hyphae fertiles elongatae, sporangia in ramis lateralibus 2—7 μ diam. gerentes. Sporangia globosa, nigra 34—54 μ diam. Columellae fuliginosae, globosae vel elongatae, apicibus papillatis 17—34 × 11—30 μ. Sporae globosae vel subglobosae, fuliginosae, asperulatae 6½—8½ μ diam.

Colonies grey, 5 mm or more high. Hyphae arching, strongly branched, occasionnally with a crosswall, 10—14 μ in diam. Sporangiophores along those threads 2—7 μ in diam. sometimes in fascicles of 2—3. Sporangia globose, black 34—54 μ in diam. Columella greyish brown in color, globose, elongated, short cylindric till about conical, with funnel-shaped apophyse and mostly a low collar. Top often provided with short appendages or broad outgrowths, 17—34 × 11—30 μ. Spores globose till subglobose, pale brownish, brown grey in mass, finely but distinctly granulated, 6½—8½ μ in diam.

Java, Bogor on rabbit dung.

This species, which is nearly related to *A. cristata,* can be easily distinguished from that species by its granulated, much larger spores.

Absidia spinosa Lendner Muc. Suisse 132. 1908 var. **azygospora** Boedijn nov. var. (Fig. 4).

A Absidia spinosa differt azygosporis copiosis; absentia zygosporarum.

Colonies greyish brown, about mouse grey Ridgway, 1½—2 cm high. Hyphae arching, brown colored 6—15 μ in diam. bearing the sporangiophores 1½—8 μ in diam. usually provided with a crosswall near the apophyse. Sporangia brown, globose 10—39 μ in diam. Columella semiglobose, hyaline 8—25 μ in diam. usually with a short, slender appendage 2—6½ μ long and a funnel-shaped apophyse. A collar is often present. Spores rather regular cylindric, colorless, 3½—5 × 1½—2 μ. Azygospores abundant. Short outgrowths are formed on the hyphae, which are broadening more or less funnellike near the tip, to give rise to a kind of suspensor. On the broad portion the azygospore is originating. Sometimes the suspensors are branching, each branch bearing 1—2 spores, or 2—3 spores are formed on one suspensor. Occasionally 2 or even 3 spores on a suspensor may fuse to form one irregular spore. In all cases 8—14 hyphae are growing out of the suspensor and are more or less surrounding the spores. In some cases those threads are straight instead of incurved. Azygopores globose, red-brown, the wall covered by rather flat

pyramidal warts with fringed border; 70—107 μ in diam. Circinate hyphae 4—9 μ in diam.

Java, Malang, isolated from the soil of a coffee garden.

This variety is characterised by the abundance of azygospores, while real zygospores are wholly lacking. The peculiar mode of formation of those spores is also noteworthy.

Fig. 4. *Absidia spinosa* var. *azygospora*. — 1. Early beginning of an azygospore. 2. different modes of azygospore formation. 3. two partly fused azygospores. 4. three partly fused azygospores. 5. sporangium. 6. columellae. 7. sporangiospores.

Phycomyces.

Phycomyces agaricicola Boedijn nov. spec. (Fig. 5).

Mycelium ramosum, septatum compositum ex hyphis 7—20 μ diam. Sporangiophorae 1—2½ cm altae, pallide brunneae, infra 84—140 μ diam. supra 65—100 μ diam. Sporangia globosa, in juventute flavida, in maturitate nigrescentia 150—400 μ diam. cum membrana fragmentata. Columellae hemisphaericae vel cylindricae, fuliginosae 100—208 × 96—182 μ. Sporae hyalinae vel subhyalinae, cylindricae, interdum inaequilaterales vel leviter curvulae 21—54 × 7—17 μ.

In and on the substratum a colorless branched and septated mycelium with threads 7—20 μ broad. From this mycelium the sporangiophores are arising, which are 1—2½ cm high, with inflated base

and attenuated near the apex. They are 84—140 μ in diam. near the base, 65—100 μ in diam. in the middle, the wall pale brown, sometimes with septae near the base. Sporangia globose, at first yellow, afterwards becoming very dark nearly black, 150—400 μ in diam. Sporangial wall smooth, fragmentating. Columella hemisphaerical or cylindric with broadly rounded apex, sometimes subpyriform, dirty brown in color, 100—208 × 96—182 μ. Spores very irregular, mostly long cylindrical, hardly attenuated at the poles which are broadly rounded. Often one side flattened or the spore is slightly curved. They are hyaline till subhyaline, dirty yellow in mass, with indistinct granular contents; 21—54 × 7—17 μ. Most common dimensions 38—47 × 10—12 μ.

Java, Tjibodas, on decaying *Russula* spec. and other *Agaricaceae*.

Because this species was only found growing on the fructifications of *Agaricaceae*, the first impression was that we had to deal with a member of the genus *Spinellus*. But the absence of much aerial mycelium, the columella without apophyse and the hyaline spores are characters typical for the genus *Phycomyces*. On the other hand we lack the metallic iridescence so characteristic for most species of this genus.

Phycomyces microsporus V. Tieghem Ann. Sc. Nat. 6 sér. **1**. 64. 1875.

Sporangiophores up till 5 cm long, of a dark violet color with a distinct greenish hue; 60—75 μ in diam. Sporangia globose, dark, up till about 500 μ in diam. Columella oval, subcylindric till subpyriform, 270—306 × 200—250 μ. Sometimes provided with orange oil droplets. Spores very pale yellow, nearly subhyaline, dark yellow in mass, cylindric 11—17½ × 5½—9 μ.

Java, Bogor, on rabbit dung.

Sporodiniella Boedijn nov. gen.

Hyphis fertilibus erectis, supra in formam umbellae digestis. Hyphae umbellae dichotome ramosae. Furca ultima ex hyphis sporangiferis et sterilibus composita. Sporangia globosa, brunnea. Columellae globosae. Sporae subglobosae, hyalinae.

Sporangiophores long, erect, ending in an umbel of many equal spreading branches. Those threads branching dichotomously one or a few times. Last branching consisting of a sporangium bearing and a sterile thread, which is growing mostly longer than the other. Sporangia globose, brown, wall very fugacious. Columella globose, without collar Spores subglobose, colorless.

Sporodiniella umbellata Boedijn nov. spec. (Fig. 6).

Coloniae pallide brunneae, 12 mm altae. Sporangiophorae erectae 36—56 μ diam. saepe septatae, interdum ramosae. Apice hyphis um-

bellatim digestae. Hyphae umbellarum 20—36 μ diam. dichotome ramosae, rami ultimi sporangiferi sive steriles. Sporangia globosa brunnea, 28—50 μ diam. Columellae globosae 17—32 μ diam. Sporae subglobosae, hyalinae subpolygoniae.

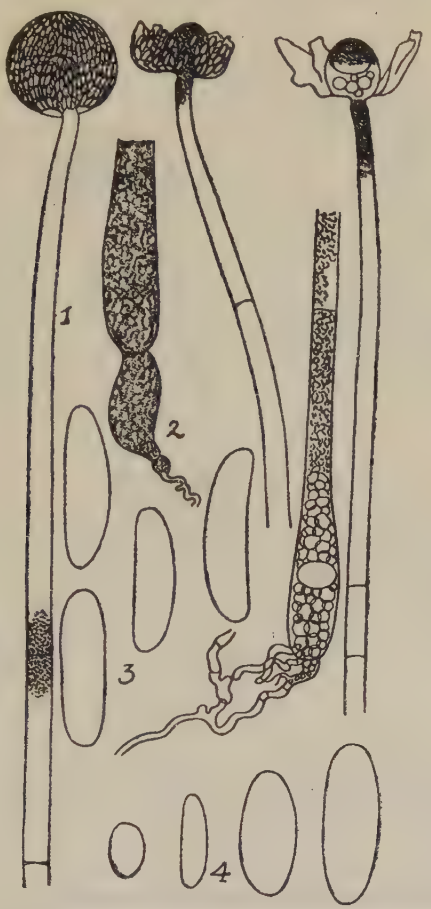

Fig. 5. *Phycomyces agaricicola.* — 1. Tops of sporangiophores with sporangia. 2. Bases of sporangiophores. 3. sporangiospores. 4. aberrant sporangiospores.

Colonies pale brown, consisting of erect sporangiophores up till 12 mm long. Mainstem 36—56 μ broad, pale brown, often with septae, sometimes branched, ending in an umbel of equal spreading branches 20—36 μ in diam. In small specimens a few, in well developed material many such branches. Those secondary threads dichotomously branching one till several times. The last furcation consisting of a sporangium bearing and a sterile often longer thread. Sometimes

both threads bearing a sporangium. Sporaniga, globose, brown 28—50 μ in diam. Wall very fugacious. Columella globose, with apophyse, but without collar 17—32 μ in diam. Spores colorless, very variable as to shape and dimensions, globose, subglobose till elongated, somewhat subangular smooth, 4—8 μ in diam.

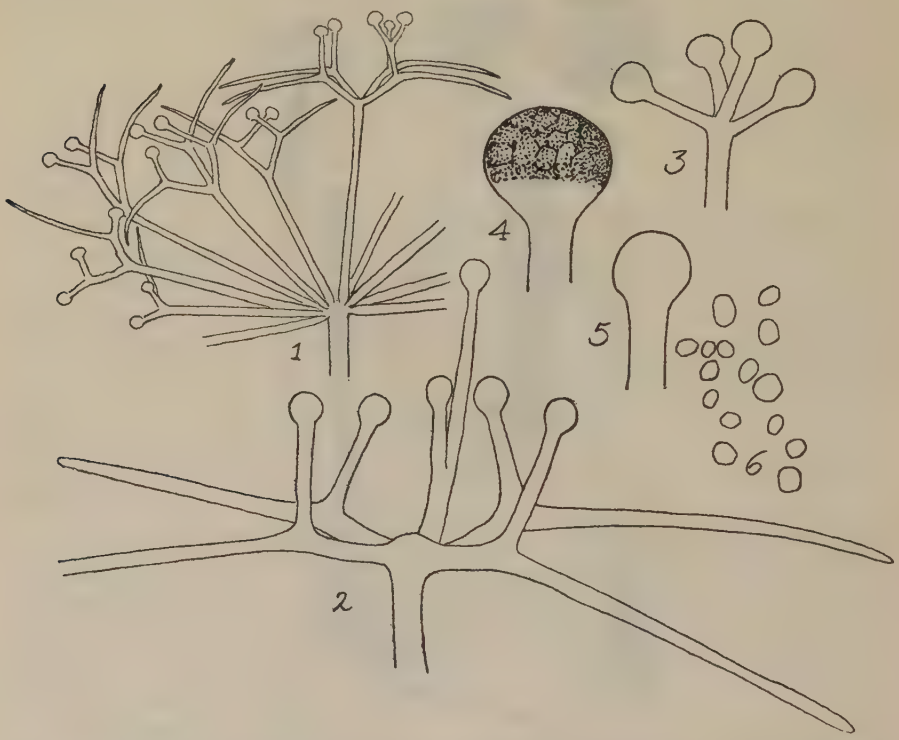

Fig. 6. *Sporodiniella umbellata.* — 1. Top of plant, semidiagrammatic, 2. End of a branch. 3. aberrant branch. 4. sporangium. 5. columella. 6. sporangiospores.

Sumatra, Pematang Siantar, on the remnants of a small insect, probably a member of the *Microlepidoptera.*

Pilobolaceae.

Pilobolus, Pilaira, Utharomyces.

Pilobolus.

Pilobolus crystallinus v. Tieghem. Ann. Sc. Nat. sér. 6, **4**. 335. 1876.

Trophocyst with apophyse, oblong 500—575 × 200—230 μ. Sporangiophores 5—15 mm long, 115—160 μ broad. Subsporangial vesicle oviform, colorless except for an orange ring at the base 400—920 ×

350—720 μ. Sporangia semiglobose, more or less flattened, black, sometimes with a network of pale lines, 138—345 μ high, 287—529 μ broad near the base. Columella broadly conical, 92—287 μ high, 172—345 μ broad below. Spores elliptic, hyaline, dark yellow in mass, 7—10 × 4—6 μ.

Java, Bogor, common on dung of herbivores.

Pilobolus Kleinii v. Tieghem. Ann. Sc. Nat. sér. 6, **4**. 337. 1876.

Trophocyst elliptic, hyaline with pale orange colored apophyse 400—460 × 200—250 μ. Sporangiophores 1—6 mm high, usually 4—5 mm, 34—126 μ broad, usually 92—115 μ in diam. Subsporangial vesicle more or less oviform, hyaline except for an orange colored ring at the base, 414—805 × 333—595 μ. (In dwarf specimens 161—241 × 113—160 μ). Sporangia semiglobose, more or less flattened, black 126—240 μ high, 276—356 μ broad at the base. (In dwarf specimens 46—80 μ high, 57—149 μ broad). Columella nipple-shaped, 160—185 μ long, 149—182 μ broad at the base, attenuated part 46—70 μ broad. Spores elliptic very pale yellow, dark yellow in mass, 11—13 × 5½—7 μ.

Java, Bogor, very common on dung of herbivores.

On dung of pigs a strain was found with sporangiophores 5—12 mm high, characterized by the presence of the orange color in the whole subsporangial vesicle as well as in the upper part of the stipe. The spores 9—12 × 6—8 μ are singly darker yellow and a triffle broader as in our species. These differences however are hardly sufficient to establish a new variety.

On a few occasions in dense growths of *P. Kleinii,* some sporangia were found, containing large, globose till subglobose spores 11—17 μ in diam. This form wholly agrees with *Pilobolus sphaerosporus* (Grove) Palla, Oesterr. Bot. Zeitung 50. 365. 1900. As this species as far as I know is always found in company of *P. Kleinii* it may well be only a form of this species with abnormally large spores. Such cases are now known to occur in many of the *Mucorales.* Anyhow it is questionable whether *P. sphaerosporus* can be considered to represent a valid species.

Pilobolus Morinii Sacc. Syll. Fung. **17**. 505. 1905.

Trophocyst oval, hyaline, apophyse with granular contents, sometimes yellowish, 322—494 × 184—310 μ. Sporangiophores 1—5 mm high, 23—161 μ broad, orange colored near the tip. Subsporangial vesicle oviform, orange colored at the base, pale orange till subhyaline in the upper part; 356—713 × 322—632 μ. Sporangia semiglobose, flattened, black, sometimes provided with a network of pale lines, 138—253 μ high, 253—460 μ broad near the base. Columella conical, with rounded top and a suggestion of a constriction in the middle 92—195 μ

high, 126—230 μ broad near the base. Spores round, yellow, dark yellow in mass, 5½—7 μ in diam.

Java, Bogor, on rabbit dung.

This species is well defined by its round yellow spores.

Pilobolus hyalosporus Boedijn nov. spec. (Fig. 7).

Trophocystis subglobosa vel elongata, cum apohysi, pallide aurantiaca 494—575 × 253—322 μ. Sporangiophorae 5—10 mm altae, concolorae, 80—115 μ diam. Vesiculae subsporangiolae, oviformes, concolores 517—630 × 340—494 μ. Sporangia hemisphaerica, nigra

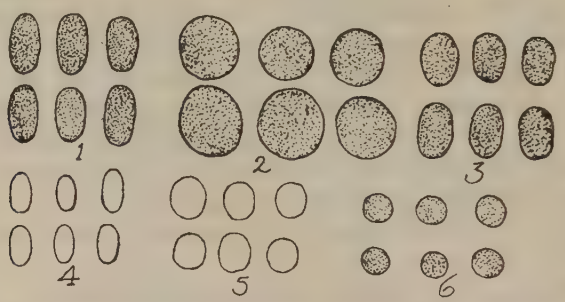

Fig. 7. Sporangiospores of *Pilobolus* species. — 1. *P. Kleinii.* 2. *P. sphaerosporus.* 3. *P. Kleinii,* strain from hogs dung. 4. *P. crystallinus.* 5. *P. hyalosporus.* 6. *P. Morinii.* The stippling of the spores indicates yellow color.

216—276 μ alta, 264—356 μ lata. Columellae conicae 160—180 μ altae, infra 184—207 μ latae. Sporae hyalinae, in cumulo flavidae, subglobosae vel elongatae 7—9½ × 6—8 μ.

Trophocyst subglobose till broadly elliptical, with apophyse, pale orange in color; 494—575 × 253—322 μ. Sporangiophores 5—10 mm high, pale orange, 80—115 μ broad. Subsporangial vesicle oviform, pale orange, 517—630 × 340—494 μ. Sporangia hemisphaerical, not much flattened black, sometimes provided with a network of pale lines, 218—276 μ high, 264—356 μ broad near the base. Columella conical, 160—180 μ high, 184—207 μ broad near the base. Spores hyaline, yellow in mass, subglobose till broad oval, 7—9½ × 6—8 μ.

Java, Bogor, on sheeps dung.

Utharomyces Boedijn nov. gen.

Trophocystis apophysatis aut sine apophysis. Sporangiophorae rectae demum decumbentes. Vesiculae subsporangialae subglobosae, Hyphis apicis vesiculae crasse tunicatis et nigro brunneis. Sporangia globosa, nigra. Columellae superne globosae, inferne constrictae. Sporae globosae vel subglobosae, dilute griseae, glabrae.

Trophocyst with or without apophyse. Sporangiophores erect, later toppling over. At first diameter of stipe the same over its whole

length; afterwards at some distance of the sporangium a swelling is starting, which becomes large and subglobose. The part of the stalk above this vesicle becomes thick-walled and dark brown in color. Sporangium globose, somewhat flattened at the base, black, not shot away, but opening in a star-shaped manner. Columella globose, deeply constricted near the base, which is broad and truncated. Spores pale grey, dark grey in mass, globose till subglobose, smooth.

Fig. 8. *Utharomyces epallocaulus.* — 1. Top of young plant before formation of the subsporangial vesicle. 2. Sporangia with subsporangial vesicles. 3. detached sporangium with part of subsporangial vesicle. 4. such a sporangium attached to a thread of Mucor mucedo. 5. trophocyst. 6. columellae. 7. sporangiospores.

This genus certainly belongs in the *Pilobolaceae.* It shows all the typical characters of this family; viz. a trophocyst, subsporangial vesicle, persistent sporangial wall. Even the prismatic crystals of calcium oxalate, always found in *Pilobolus* are also present, though not so much and smaller in size. But as in *Pilaira* the sporangium is not forcibly shot away. It is set free by the disintegration of the subsporangial vesicle and growing mostly intermixed with other *Mucorales,* may cling to the hyphae of those plants. Afterwards the sporangium opens at the top, so the spores may be dispersed.

Utharomyces epallocaulus Boedijn nov. spec. (Fig. 8).

Trophocystis subglobosis 96—200 × 63—120 μ. Sporangiophorae rectae, usque ad 5 mm longae, 14—34 μ crassae. Vesiculae subsporangialae, subglobosae vel oviformes 55—187 × 55—182 μ. Hyphis apicis vesiculae 20—85 × 12—27 μ; crasse tunicatis et nigro brunneis. Tunica 2½—5 μ diam. Sporangia globosa, nigra, basi subtruncata, 55—132 μ alta, 70—170 μ lata. Columellae superne globosae, inferne constrictae et truncatae 66—120 μ altae, basi 52—82 μ diam. Sporae dilute griseae, globosae vel subglobosae, glabrae 5½—8 μ diam.

Trophocyst with or without apophyse, subglobose till somewhat elongated with granular contents, 96—200 × 63—120 μ. Sporangiophores erect, later becoming prostrate, 5 mm or more long, 14—34 μ broad, at first of the same diameter, afterwards a swelling starts at some distance of the sporangium. This subsporangial vesicle subglobose till more or less oviform, thinwalled 55—187 × 55—182 μ. The stalk between vesicle and sporangium 20—85 × 12—27 μ becomes thickwalled and dark brown, often nearly opaque black near the sporangium. Wall 2½—5 μ broad. Sporangium at first globose and yellow of color, later turning black and more or less flattened near the base, 55—132 μ high, 70—170 μ broad at the base. The sporangium opens at the top in a star-shaped manner, leaving a collar at the base of the columella. Columella globose with a deep constriction near the base, which is truncated; 66—120 μ high, globose part at the top 52—82 μ in diam. constriction 23—31 μ broad, base 39—62 μ broad. Spores grey, dark grey in mass, globose till subglobose smooth, 5½—8 μ in diam.

Java, Bogor, on dung of herbivores, on excrements of rat.

This species is mostly found growing between other *Mucorales* such as *Mucor, Circinella* and *Helicostylum.* Typical ist that the sporangia are separated from the sporangiophores by disintegration of the wall of the subsporangial vesicle. By sinking down between the surrounding *Mucorales,* part of the subsporangial vesicle bearing the sporangium may attach itself to the threads of those fungi. In one instance, viz. on the excrements of rats, the species was growing in pure stand.

Thamnidiaceae.

Thamnidium, Helicostylum, Dicranophora, Chaetocladium, Cokeromyces.

Helicostylum.

Helicostylum nigricans v. Tieghem. Ann. Sc. Nat. 6 sér. **4.** 374. 1876.

Helicostylum piriforme Bainier. Ann. Sc. Nat. 6 sér. **15.** 85. 1883.

Colonies up till 6 cm high, at first white, later with brownish hue. Sporangiophores erect, sometimes branched 15—50 μ in diam.

with root-like threads at the base 6—24 μ broad; forming short stolones which may root at their tips and give rise to new sporangiophores. Along the mainstem 1 till 6 compact bundles of sporangiola 115—500 μ in diam. are to be found. They are surrounding the stem completely or are only attached on one side. They originate from short, very crowded, more or less dichotomously branched threads, which are much flattened near the junction with the mainstem, 6—18 μ in diam. forming a compact rozette-like structure. The last branches of the rozette are giving rise to the long stalks of the sporangiola, 2—5 μ broad. Sporangiola subglobose or subpyriform, incurved, cut of from the stalk by a crosswall or with a very flat columella, many spored, 15—32 μ in diam. or 19—41 × 18—37 μ. They are detached with the stalk. Spores hyaline elliptic 6½—9 × 4—5 μ. Mainstem closing with a large sporangium, a bundle of sporangiola or a sterile point. Terminal sporangium globose dark, 75—250 μ in diam. Sporangial wall very fugacious, provided with fine needles of calcium oxalate. Columella subglobose till cylindric with a collar at the base; 35—128 × 30—92 μ. Apophyse funnelshaped of a pale brown color. The brown color extending downwards in the threads and even in the sporangiola. Sporangiospores colorless, elliptic 7—9½ × 4—5½ μ.

Java, Bogor, common on dung of herbivores.

The only species of *Helicostylum*, which is described as forming stolones is *Helicostylum repens* v. Tieghem, Ann. Sc. Nat. 6 sér. 4. 389. 1876. But the spores in that species are said to be globose and 12 × 10 μ.

Choanephoraceae.

Blakeslea, Choanephora.

Blakeslea.

Blakeslea trispora Thaxter, Bot. Gaz, **58**. 353. 1914.

Sporangiolophores 4 till 5 mm long, 10—30 μ broad. At the top subdichotomously branching, the separate branches typically constricted at regular intervals 5—10 μ broad. All branches ending in vesicular swellings 20—38 μ in diam. Those heads wholly covered by the sporangiola, which are attached with a short stalk and are oval 14—18 × 12—16 μ, containing 2—6, mostly 3 spores. After the sporangiola are shed, the vesicles are showing semiglobose protuberances 1—2 μ in diam. Spores from the sporangiola dull brown, with a slight violet tinge, elliptic, mostly unequal-sided, striate by the presence of very low longitudinal ribs, 11—16 × 5—7 μ, provided at both poles with a bundle of very delicate, radiating threads 11—13 μ long. Those threads often originating from a very small hyaline mucro.

Sporangiophores up till 3 mm long, 6—30 μ broad, more or less strongly curved at the tip, sometimes nearly straight and bearing a globose sporangium 39—148 μ in diam. which at first is yellowish brown, turning nearly black at maturity. Sporangial wall, colorless or weakly tinted covered by very short needles of calcium oxalate, often nearly smooth. Columella subglobose till pear-shaped, with a distinct collar at the base, 18—36 μ in diam. or 8—36 × 5—28 μ. Sporangiospores yellowish brown in mass, singly very pale ochraceous brown, sometimes nearly subhyaline elliptic, often unequal-sided, provided with a striation consisting of very low ribs 9—16 × 4½—6 μ, at both poles with a bundle of radiating delicate threads 8—20 μ long, mostly originating from a small hyaline mucro. Zygospores on strongly bent, sometimes nearly parallel suspensors. Both or sometimes only one of them with a pale orange contents. Zygospores broadly oval or elongated dome-shaped 90—140 × 62—97 μ. Wall finely striate in longitudinal direction, at first pale colored and with a coarse, granular contents, later turning brown, with a large central gutta, finally when fully mature opaque black. Chlamydospores intercallary in the mycelium, with slightly thickened cellwall and bright yellow contents, very variable as to shape and dimensions, globose till elongated 12—30 μ in diam. or 14—45 × 7—29 μ.

Sumatra, Medan, as a weak parasite on various plants; on coagulated latex from *Hevea brasiliensis*. — Java, Bogor, on fading plant material; isolated from soil and from the air.

Recently the genus *Blakeslea* has been incorporated into the genus *Choanephora*. The chief reason being, that the conidia of *Choanephora* are considered to represent one spored sporangiola. However there is not much conclusive evidence to substantiate this theory. And as genera are differentiated on real and not on theoretical characters we still can maintain the genus *Blakeslea*. The principal characters are a repeatedly subdichotomously branched sporangiolophore. All branches ending in vesicles bearing the mostly 3 spored sporangiola. The spores are striate and provided at both poles with a bundle of delicate threads. In *Choanephora* the unbranched conidiophore ends in a vesicle from which mostly unbranched threads are originating, which are ending in vesicles bearing the conidia. Conidia either smooth or striate, without the bundles of threads.

Choanephora.

Choanephora infundibulifera (Currey) Sacc. Syll. Fung. **9**. 339. 1891.

Choanephora conjuncta Couch journ. Elisha Mitchell Sc. Soc. **41**. 143. 1925.

Conidiophores up till 7 mm high, 6—45 μ broad, ending with a more or less distinct swelling 24—60 μ in diam. From this swelling

simple or forked sometimes even bifurcated branches arise, the longer ones often slightly constricted at regular distances, 18—70 × 5—10 μ, often somewhat attenuated near the base. All branches ending in globose till oval vesicles 15—39 μ in diam. or 29—41 × 22—31 μ. On those heads the conidia are borne on short sterigmata. Conidia brown with a violet tinge, oval or suboviform, smooth, broadly rounded at the poles, slightly but distinctly attenuated near the place of attachement, with or without a hyaline mucro, 9—23 × 8—13 μ. Sporangiophores unbranched sometimes decumbent, up till 1 mm long, 7—15 μ broad; top curved and bearing a globose sporangium 15—90 μ in diam. which at maturity is nearly black. Sporangial wall subhyaline till brownish, finely warty by the presence of crystals of calcium oxalate. The warty incrustation often also on the top of the stipe. Wall not diffluent but splitting in an irregular way. Columella subglobose till hemisphaerical sometimes broader than high, with or without a collar, 7—37 μ in diam. or 17—19 μ high, 14—27 μ broad. Very small sporangia containing only a few spores often present. Sporangiospores very variable as to shape and dimensions, mostly more or less elliptic but often broadly elliptic till oval, sometimes even subglobose or with irregular outline; 8—21½ × 7—17 μ. Most common dimensions 16—18 × 8—12 μ, greyish brown in color, finely striated in longitudinal direction. This striation sometimes indistinct or even wanting. At both poles there is a bundle of very delicate, hyaline threads 20—32 μ long. Zygospores very variable mostly globose till subglobose, with the base more or less distinctly truncated, often somewhat broader than high; at first pale brown, when fully mature dark yellowish brown, but always translucent, with a large central gutta and a thick cellwall, which is finely horizontally or somewhat obliquely striated, 49—85 μ in diam. or 41—75 high, 59—82 μ broad. Frequent dimensions 56—63 μ in diam. Chlamydospores rather rare originating as elongated, slightly thickwalled cells in the mycelium 24—54 × 10—17 μ.

Sumatra, Medan, on fading flowers of *Hibiscus rosa sinensis.* — Java, Bogor, on fading flowers of *Hibiscus rosa sinensis* and other *Malvaceae.* This species is so common, that practically every batch of flowers yields this fungus.

Giant conidia are sometimes met with, especially in material on natural substrata. Sometimes all the conidia of a vesicle are of this type or they are intermingled between normal conidia. They are more or less eggshaped and measure 21—38 × 9½—24 μ.

The existing descriptions of this very common species are mostly inaccurate. In Zycha (101) the conidia are even said to be striate and his incomplete description clearly indicates *Ch. cucurbitarum.*

Choanephora cucurbitarum (Berk. et Rav.) Thaxter Rhodora **5**, 97. 1903.

Choanephora manshurica (Saito et Naganishi) Tai, Sinensia 4. 219. 1934.

Conidiophores 7 mm or more long, 12—61 μ broad; ending in a more or less distinct swelling 24—80 μ in diam. From this swelling simple or in robust specimens one or two times branched threads are arising; 17—68 × 5—20 μ. At the base they are sometimes slightly swollen and 17—22 μ broad. All branches ending in vesicular swellings 20—51 μ in diam. On those vesicles the conidia are borne on short sterigmata. Conidia violet brown, elliptic, acuminate obtuse, longitudinal striate by low sparingly anastomosing white ribs, with or without a mucro; 10—27 × 7—14 μ. Sporangiophores unbranched, mostly shorter than the conidiophores, 9—34 μ broad, more or less strongly bent at the tip. Sporangia globose, black when fully ripe, 27—200 μ in diam. Sporangial wall colorless or pale brownish, wholly covered by short needles of calcium oxalate, 1—1½ μ long; rather persistent, splitting at maturity. Columella subglobose till pearshaped, with a distinct collar at the base, 18—36 μ in diam. or 27—119 × 24—98 μ.

Sporangiospores very variable as to shape and dimensins, mostly more or less elliptic, sometimes unequal-sided, one pole slightly drawn out, broadly oval or with irregular outline; violet brown usually paler than the conidia, finely striate in longitudinal direction or striae very indistinct and sometimes spores wholly smooth, 15—27 × 6—10 μ, with a bundle of very delicate threads 15—36 μ long at both poles. Zygospores very variable, subglobose, depressed globose, sometimes with one or two appendages, formed by the elongation of the zygote into one or both suspensors; at first brown, wall finely horizontally or somewhat obliquely striate; 54—95 μ in diam. or 37—50 μ high, 45—57 μ broad. When fully mature opaque brownish black till black. One or both suspensors sometimes with yellow contents. Chlamydospores intercalary, sometimes in short rows, colorless, wih slightly thickened cellwall and granular contents, subglobose till elongated 14—50 × 9—25 μ.

Sumatra, Medan, as a weak parasite on several plants; on coagulated latex from *Hevea brasiliensis*. — Verlaten eiland (Krakatau group) on a rotten fruit. — Java, Bogor, as a weak parasite on *Lactuca sativa, Phaseolus vulgaris, Asclepias curassavica.* Also common on fading flowers of *Malvaceae.*

Giant conidia as in the preceding species up till 40 μ long, 25 μ broad.

Cunninghamellaceae.

Cunninghamella, Phascolomyces, Thamnocephalis.

The genus *Mycotypha* placed by Hesseltine (51) in this family, in my opinion is no Phycomycete and has to be inserted into the *Moniliales.*

Cunninghamella Bainieri Naumov Clé d, Mucorinées 107. 1939.

Colonies white till pale grey, somewhat glossy, up till 3 cm high. Conidiophores erect, sometimes branched near the base, 5—20 μ in diam. forming creeping stolones up till 24 μ broad, from which new conidiophores may arise. All erect stems ending in a capitate vesicle 30—60 μ in diam. Along the main threads 1 till 6 whorls of side branches 2½—45 × 2½—5 μ are to be found. On the place where those branches are originating the mainstem is mostly swollen and 10—27½ μ broad. The side branches 2—12 in number, usually 3—5 are attenuated near their base and often gradually increasing in diameter near the elongated end vesicle, which is 7—55 μ broad. The whole branch including vesicle therefore often clubshaped. Crosswalls in all threads very rare. On all vesicles the conidia are originating on short sterigmata. After they are shed, only small inconspicuous scars are left. Conidia usually globose, with rather long echinulation, colorless, 8—14 μ in diam. Most common dimensions 9—11 μ. Giant conidia globose till subglobose, with much shorter echinulation, 14—28 × 10—20 μ, often on separate heads. Sometimes the giant conidia are found singly on short irregular branches 10—28 × 1½—5½ μ, directly on the mainthread. Heads with conidia intermediate between the normal and the giant conidia may also be observed.

Java, Tjampea, on rotten wood in a cave. — Bogor, isolated several times from the soil. Also often as a contaminant in mould cultures.

Cunninghamella Blakesleeana Lendner, Bull. Soc. Bot. Geneva **19.** 234. 1927.

Colonies white, sometimes with a yellowish hue, about ivory yellow Ridgway, 1½ cm or more high. Rhizoidal tufts are abundantly formed on the aerial threads. Conidiophores erect 7½—25 μ in diam. ending with a capitate vesicle 57—80 μ in diam. Side branches irregular placed, not in whorls, often dichotomously branched, 3½—12½ μ broad. All branches ending in globose vesicles 15—43 μ in diam. Conidia ovoid with short echinulation 9—24 × 7—13 μ. Most common dimensions 15—16 × 11—12 μ.

Java, Bogor, isolated from the soil.

Cunninghamella Bertholletiae Stadel, Diss. Kiel 1. 35. 1911.

Colonies 2 cm or more high, of a pale grey color. Conidiophores erect 6—10 μ broad, ending with a capitate vesicle 25—37 μ in diam. Side branches in a few whorls 5—25 × 2½—7½ μ, ending also in vesicles 10—27 μ in diam. Conidia predominantly ovoid, with short echinulation, 8—14 × 6—11 μ. All hyphae containing much oil.

Chlamydospores common usually intercalary in the mycelial threads. mostly, cylindric, with granular contents and slightly thickened cell-wall, 9½—43 × 5½—17 μ.

Sumatra, Medan, isolated from the air. — Java, Bogor, isolated from the soil and from a branch of *Derris elliptica.*

Fig. 9. *Cunninghamella phaeospora.* — 1. Conidiophores. 2. Mycelium with oil containing cells. 3. conidia.

Cunninghamella phaeospora Boedijn nov. spec. (Fig. 9).

Coloniae 2 cm altae, colore sordide albidae, deinde griseae. Mycelio hyalino, repente, hyphis ramosis 6½—14 μ diam. cum cellulis inflatis 14—53 μ diam. et vesiculis lateralibus 56—61 × 40—47 μ, repletis guttulis oleosis majusculis praeditis. Conidiophorae erectae 7½—18 μ diam. apice in vesiculam 27½—55 μ diam. terminatae. Rami laterales verticillati 5—112 × 2—8½ μ plerumque 15—37 × 5 μ in vesiculae, globosae vel subglobosae 10—30 μ diam. terminati. Conidia globosa vel subglobosa, breviter echinulata, pallide fusca 9—15 μ diam. in cumulo sordide brunnea.

Colonies up till 2 cm high, at first white, later pale grey, finely dotted with dark specks under a hand lense. Reverse of colonies pale

yellow, about between Mustard yellow and amber yellow Ridgway. All hyphae containing much oil, especially the mycelium in the substratum, 6½—14 μ in diam., which is forming globose or subglobose vesicles, either intercalary or on short side branches, 14—53 μ in diam. or 56—61 × 40—47 μ; wholly filled with oil. Conidiophores erect, 7½—18 μ in diam. ending with a capitate vesicle 27½—55 μ in diam. Side branches in 2—3 whorls along the mainstem, 5—112 × 2—8½ μ, usually 15—37 × 5 μ mostly 3—9 branches in a whorl. All ending in globose till subglobose heads 10—30 μ in diam. Conidia globose till subglobose, with short echinulation, 9—15 μ in diam. Dull brown in mass, singly brown about woodbrown Ridgway.

Java, Malang, isolated from the soil of a coffee garden.

Phascolomyces Boedijn nov. gen.

Mycelium ex hyphis inflatis, brunneis, intus granulatis compositum. Conidiophorae erectae, sympodialiter ramosae, leviter granulatae, apice in vesiculam inflatae. Vesiculae laterales breviter stipitatae vel sessiles, semiglobosae aut irregulares. Conidia globosa, hyalina, glabra, in apice sterigmatorum longorum nascentia. Conidia libera parte sterigmatis auctae.

Mycelium in substratum forming intercalary, single or in short rows irregular much swollen, brown colored cells with coarse granular contents. Conidiophores erect, sympodially branched, with finely granulated cellwall. All branches ending in capitate vesicles. Along the threads also lateral vesicles, shortly stalked or sessile and semiglobose. Conidia on long sterigmata on the vesicles, globose, colorless, smooth. When shed part of sterigma mostly adhering.

Phascolomyces articulosus Boedijn nov. spec. (Fig. 10).

Mycelium ex hyphis ramosis, plerumque inflatis compositum. Cellulae inflatae solitariae vel catenulatae, globosae, subglobosae, elongatae vel irregulares, brunneae intus granulosae 108—380 × 72—180 μ. Conidiophorae erectae, sympodialiter ramosae, leviter granulatae 3½—20½ μ diam. plerumque 10—12 μ diam. in vesiculam 20—85 μ diam. dilatatae. Vesiculae laterales breviter stipitatae vel sessiles, globosae, subglobosae vel irregulares; 4—36 μ diam. Sterigmata 7—20½ × 1 μ. Conidia globosa, hyalina, glabra, plerumque pedicellata 7—12 μ diam.

Colonies pale grey, 1½—3 cm high. Reverse of cultures darkly mottled becoming nearly black in old cultures. Mycelium in substratum much branched 12—50 μ in diam. forming intercalary, single or in short rows globose, subglobose, elongated till irregular shaped, much swollen brown colored cells with coarse granular contents, 108—380 × 72—180 μ. On natural substrata mostly much smaller. Conidiophores sympodially branched, wall usually finely granulated,

occasionally with a septum near the base of a side branch, contents often with oil, measuring 3½—20½ μ, usually 10—12 μ in diam. Rhizoidal tufts on the aerial threads not rare. All threads ending in capitate vesicles 20—85 μ in diam. Along the threads also lateral vesicles, either short stalked or wholly sessile 4—36 μ in diam. The sessile heads semiglobose or irregular shaped. Conidia formed on the

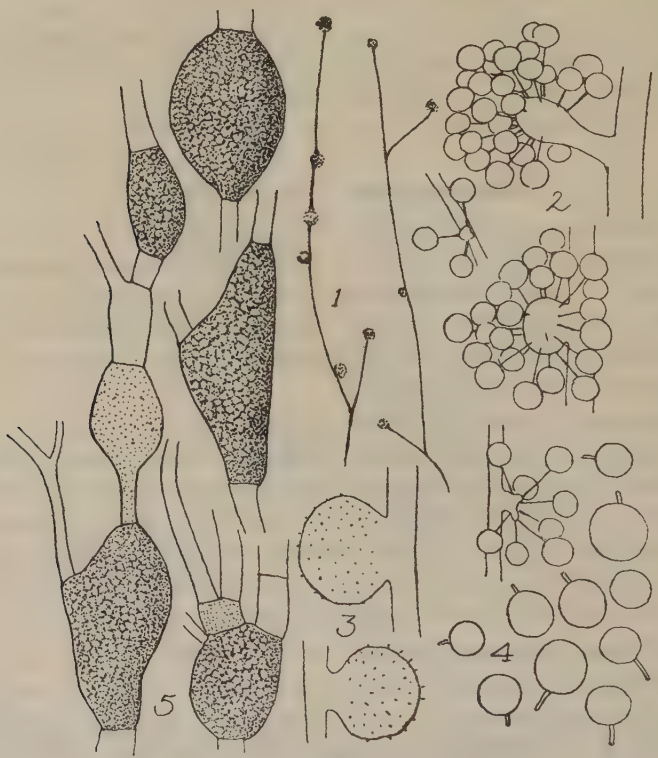

Fig. 10. *Phascolomyces articulosus.* — 1. conidiophores. 2. different types of lateral vesicles with conidia. 3. sessile vesicles without conidia. 4. conidia. 5. giant cells of mycelium filled with reserve food.

vesicles on very long sterigmata, 7—20½ × 1 μ. They are globose, hyaline, smooth, 7—17 μ in diam. When shed usually with part of the sterigma.

Java, Malang, isolated from the soil of a coffee garden. — Bogor, on the excrements of rats.

Piptocephalidaceae.

Piptocephalis, Syncephalis, Syncephalopsis, Syncephalastrum, Dimargaris, Dispira.

Piptocephalis.

Piptocephalis Tieghemiana Matruchot Bull. Soc. Myc. France **16**. 58. 1900.

Sporangiophores 300 μ and more long, beautifully repeatedly dichotomously branched, occasionally with a septum, subhyaline till pale brown. Mainstem 4—7 μ, the other branches 1½—5 μ in diam. Ultimate branches bearing a globose, colorless cell 2½—5½ in diam. From this cell rod like part-sporangia 8—12 × 2—4 are radiating. Each part-sporangium containing only 2 spores. Spores cylindric, smooth, colorless 4—6 × 2½—4 μ. Together with the spores the basal cells are also shed.

Java, Bogor, parasitic on *Circinella umbellata* and *Rhizopus stolonifer.*

Our species is listed by Zycha (101) as a synonym of *Piptocephalis cylindrospora* Bainier Ann. Sc. Nat. sér. **15**. 92. 1883. But this species is described as possessing 6 spored part sporangia. The rich material which I was able to study always showed only 2 spored part sponrangia. So in my opinion *P. Tieghemiana* may be considered a distinct species.

Syncephalis.

Syncephalis cornu V. Tieghem et Le Monnier Ann. Sc. Nat. 5 sér. **17**. 376. 1873.

Sporangiophores 90—150 μ long, 4—7 μ broad near the base. Near the top strongly bent and stem gradually broadened here, reaching 14—22 μ in diam. Above this broad part diminishing in diameter and forming abruptly a globose head 21—30 μ in diam. Upperpart of this vesicle covered by the part sporangia 30—40 × 4—6 μ, containing 4—6 spores. When the spores are ripe they have a yellow color in mass. Spores elliptic, smooth 8—13 × 4—5 μ. Zygospores formed on parallel suspensors 5—6½ μ in diam., which are not different from the ordinary hyphae and from which they are cut off by a crosswall. Often from the part under the septum, short irregular branches are sprouting. Zygospores globose, yellow, wall provided with blunt pyramidal warts; 10—25 μ in diam.

Java, Bogor, common as a parasite on the larger *Mucorales.*

Syncephalis nodosa V. Tieghem Ann. Sc. Nat. 6 sér. **1**. 131. 1875.

Sporangiophores 150—170 μ long, 4—8 μ broad, hyaline except for the spore chains, which are yellowish. Stem provided with 1 till 2 faint swellings 8—9 μ in diam. Near the top stem dilating gradually, forming a head 11—14 μ in diam., which is flattened at the top. Here the part sporangia 25—30 × 2—4 μ are formed, which at first are nearly parallel and contain 5 spores. Later more or less spreading. The part sporangia are once till twice branched near the base. When

later the spores are delimited, 2 till 3 spore chains are seen originating from a basal cell. Often however it is the second cell from below, which is bearing the spore chains. All spores including the basal cells are shed, leaving no scars on the top of the head. Spores elliptic, colorless, smooth, 6½—10 × 3—5 μ.

Java, Tjampea, on *Helicostylum nigricans.* — Bogor, on *Circinella umbellata.*

Fig. 11. *Syncephalis truncata.* — 1. whole plants. 2. head of plant with part sporangia. 3. base of plant. 4. heads without part sporangia. 5. spores.

It seems that in the genus *Syncephalis* undue importance is attached to the socalled basal cells. At first the part sporangia are unseptated. Later when septae are formed, the parts under the branching may become 1 celled or 2 celled. At the place of branching those cells often show short protuberances. But in no other way are they different from the common spores.

Syncephalis asymmetrica V. Tieghem et Le Monnier Ann. Sc. Nat. 5 sér. **17**. 375. 1873.

Syncephalis Tengi Ou Sinensia **11**. 48. 1940.

Sporangiophores up till 1 mm high, at first yellow, afterwards transparent brown. Rhizoids at base 3—6 μ broad. Mainstem 18—25 μ broad near the base, 5—10 μ near top, which bears a subglobose vesicle 35—67 μ in diam. From this head except for an apophyse-like part at the base the part sporangia are radiating; 30—38 × 2½—5 μ, containing 4—6 spores. They are either single or branched near the base. The cell bearing the 2 chains of spores provided with a lateral protuberance. When all spores are shed, the vesicle is densely

covered by flat warts 1—1½ μ in diam. Spores more or less cylindric, colorless, smooth 4—6½ × 2—3 μ.

Java, Bogor, on *Circinella umbellata* and *Helicostylum nigricans*.

Syncephalis truncata Boedijn nov. spec. (Fig. 11).

Sporangiophorae pallide luteae 540—720 μ longae, inferne 15—31 μ superne 9—12 μ in diam. Rhizoideae 3—6 μ diam. Vesiculae infundibuliformes in apicibus subtruncatis 35—40 μ diam. Sporangia cylindracea tetrasporacea, parallelis 26—39 × 3 μ. Sporae cylindraceae, hyalinae, glabrae 5½—8 × 1½—2½ μ.

Sporangiophores pale yellow 540—720 μ long. Rhizoids at the base 3—6 μ in diam., sometimes septated. Stem at the base 15—33 μ broad, gradually attenuated near the top, which is 9—12 μ broad. Here the stem widens funnel-like, while the apex is subtruncate and 35—40 μ broad. Part sporangia only on the flat top, typical parallel 26—39 × 3 μ, containing 4 spores. Spores cylindric, colorless, smooth 5½—8 × 1½—2½ μ.

Java, Bogor, parasitic on *Pilobolus Kleinii*.

Syncephalopsis Boedijn nov. gen.

Sporangiophorae rectae, basi plerumque septatae et rhizoideis praeditae, apice vix inflatae. Sporangia longe cylindracea, supra sporifera, infra sterilia.

Sporangiophores with rhizoids and often a septum at the base. Apex only slightly swollen. Part sporangia long cylindrical, forming only spores in the upper half. The lower half functioning as a supporting thread for the spores. Those threads remaining when the spores are shed.

Syncephalopsis bispora (Rac.) Boedijn nov. comb.

Syncephalis bispora Rac. Bull. Acad. Sc. Cracovie 347. 1909.

Sporangiophores 426—744 μ long, subhyaline, with rhizoids 3—8 μ broad and often a septum at the base; 13—33 μ broad at the base, slightly attenuated near the top, which is 10—18 μ broad. Vesicte more or less hemisphaerical, only weakly developed, 16—27 μ in diam. From this head the part sporangia are radiating, which are long cylindrical. The upperpart forms 2 sometimes 3 large spores. The lower part remains a colorless supporting hypha 17—26 × 2½—4 μ. Spores cylindric, colorless, smooth 13½—25 × 6½—8½ μ. The supporting hyphae remaining when the spores are shed.

Java, Bogor, parasitic on *Circinella umbellata* and *Helicostylum nigricans*.

Syncephalastrum.

Syncephalastrum racemosum (Cohn) Schroeter Kryptog. Flora Schlesiens **3**. 1. 217. 1886.

Colonies grey, at last very dark, about between deep olive gray and dark olive gray Ridgway; up till 1 cm high. Mycelium with short stolones provided with branched rhizoids 2½—7½ μ in diam. Sporangiophores with many rather short lateral and some longer repeatedly branched side branches. Many branches strongly bent, Mainstem and branches 1½—30 μ in diam. ending in globose till subglobose vesicles 5—75 μ in diam. or 41—69 × 38—55 μ. Just under the vesicles or on a short distance from it, a septum is nearly allways present. Sometimes the vesicles are elongated, elliptical till nearly cylindrical, 39—67 ×

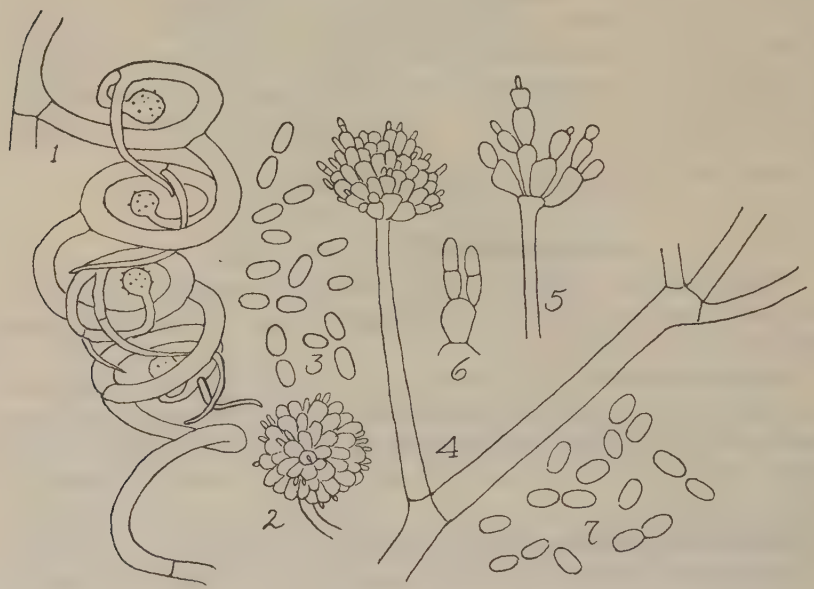

Fig. 12. 1. *Dispira cornuta.* 2. head enlarged. 3. spores. 4. *Dimargaris cristalligena.* 5. small head enlarged. 6. two part sporangia. 7. spores.

26—53 μ. Part sporangia radiating from the vesicles, 20—50 × 3—6 μ, containing 6—10 spores. Spores subhyaline dark in mass, globose, smooth 3—5 μ in diam. When all spores are shed, the vesicles are showing a pitted appearance.

Java, Bogor, isolated from the soil and from the air. A common contaminant in mold cultures.

Syncephalastrum javanicum Rac. Bull. Acad. Sc. Cracovie 347. 1909.

Java, Since Raciborski collected this species, no new material could be procured, so I cannot give any comment.

Dimargaris.

Dimargaris cristalligena V. Tieghem Ann. Sc. Nat. 6 ser. **1**. 154. 1875 (Fig. 12).

Whole plant about 1 mm or more high; subhyaline, subdichotomously branched, with septae at the base of the branches. All branches straight and 4—12 μ broad. Top of branches hardly broadened, bearing a fascicle of branched threads 20—39 μ in diam. the cells of which are swollen and constricted at the septae. Basal cells 9—11 × 4—7 μ, top cells 4—7 × 3—5 μ. On the top cells the part sporangia are borne. They are cylindric, containing only 2 spores. Spores elliptic, colorless 3—4 × 1½—2½ μ.

Java, Tjampea on *Helicostylum nigricans*.

In Zycha (101) this monotypic genus is considered to be synonymous with *Dispira*. However our material though scanty does not bear out this conception. The spore formation is much like that in *Dispira*, but the habitus of our plant is totally different. All hyphae are straight, terminating in a bundle of sporangiferous threads. In *Dispira* on the other hand, the hyphae are strongly spirally coiled, often over long distances. They bear on short side branches, overtopped by an incurved sterile thread, the sporangiferous threads on a typical globose vesicle. So it seems advisable to maintain our genus, until more and better material may be available.

Dispira.

Dispira cornuta V. Tieghem Ann. Sc. Nat. 6 sér. **1**. 160. 1875.

Dispira americana Thaxter Bot. Gaz. **20**. 517. 1895.

Whole plant 1 mm or more high, much depending on the length of the host plant; hyaline, subdichotomously branched. Main hyphae 6½—13 μ in diam. Branches spirally coiled, each branch delimited by a crosswall. Some branches 2½—5½ μ in diam. ending in a globose vesicle 8—12 μ in diam. Nearly always a branch 3—7 μ in diam. tapering into a pointed tip, is more or less overtopping the fertile branch. From the vesicle the sporangiferous threads are radiating; the whole head 28—39 μ in diam. The sporangiferous threads 2 celled, the cells constricted at the septae. Basal cells 4—5 × 2—3 μ, top cells 3½—4 × 2—3 μ. On those cells the part sporangia are arising, which are cylindric and containing 2 spores. Spores elliptic, colorless 3—4 × 2—2½ μ.

Java, Bogor on *Pilobolus Kleinii* and other *Mucorales*, no rare. — Tjampea on *Helicostylum nigricans*.

Helicocephalidaceae Boedijn nov. fam.

Coeloblastus, Mycelio hyphis ultimo gracilibus, ramosis composito. Conidiophorae erectae, non ramosae, ad apicem conidia soli-

taria vel catenulata gerentes sive apice vesiculoso inflatae et conidia in apice sterigmatorum solitaria acrogena. Conidia majuscula, continua, brunnea.

Mycelial threads very thin, branched, coenocytic. Conidiophores unbranched, coenocytic, ending either with some conidia, a spirally coiled chain of conidia or a globose vesicle bearing on short sterigmata the conidia. Conidia one celled, relatively large, brown colored.

The representatives of this new family were unanimously considered by their authors to belong to the Mucorales. Yet no definite place was ever indicated. It is especially their coenocytic organization which led to the supposition, that we have to deal with members of our order.

Helicocephalum, Rhopalomyces.

Rhopalomyces.

Rhopalomyces elegans Corda Prachtflora 3. 1839.

Mycelial threads thin, branched, unseptated. Conidiophores erect, unbranched, unseptated, about 1 mm high 7½—20 μ in diam. At the top ending in a globose vesicle 30—60 μ in diam. The surface of this vesicle more or less distinctly areolated, with a sterigma bearing a conidium in the centre of each areole. Head with conidia 112—132 μ in diam. Conidia long elliptic, brown colored, 32—41(59) × 13—15 (20) μ.

Sumatra, Medan, on rotten coffee seeds.

Java, Bogor, not rare on rotten branches and fruits.

This species is always growing in very foul environment, together with Bacteria, other moulds, eelworms etc. From the species of *Rhopalomyces* as well as those of *Helicocephalum* no one has ever succeeded in growing them in pure culture. Thaxter already mentions, that from our species, *R. strangulatus* and *Helicocephalum,* he failed to germinate the conidia in water or nutrient solutions. All my own attempts with *R. elegans* were also in vain. The conidia never germinated in water, decoctions of the substrata, nutrient agar etc. When inoculated in other mould cultures, trying to reproduce the natural environment, no growth could ever be observed. From one species of *Helicocephalum* it is known, that it grows on the eggs of Nematodes. So it may be possible that *Rhopalomyces* prefers a similar substratum, but I was unable to prove this.

Mortierellaceae.

Mortierella, Haplosporangium, Dissophora.

Mortierella.

Mortierella polycephala Coemans Bull. Acad. R. Belg. 2 sér. **15**. 536. 1863.

From a white creeping mycelium the sporangiophores are arising, which are up till 2 mm high, but mostly shorter and 17—25 μ in diam. At the base rhizoids 2½—7½ μ in diam. are present; in old specimens sometimes with some septae. Sporangiophores more or less cymosely branched, showing often some whorls of side branches 4—7½ μ in diam. All threads ending in globose sporangia 50—87 μ in diam. Sporangial wall very delicate, soon diffluent, leaving a cup-shaped collar at the tops of the branches, which are slightly rounded and broadened 9—22 μ in diam. Spores variable as to shape and dimensions, globose till oval, colorless, smooth, 11—19 μ in diam. or 21—26 × 15—19 μ. When germinating the spores are forming up till 7 germtubes.

Java, Tjampea, in a cave upon the excrements of bats.

Kickxellaceae.

Kickxella, Coemansia, Martensella, Linderina, Martensiomyces.

Coemansia.

Coemansia reversa V. Tieghem et Le Monnier Ann. Sc. Nat. 5 sér. **17**. 392. 1873.

Colonies yellow, up till 3 mm high. Conidiophores septate, 9—10 μ in diam. near the base; above mostly ending in 3 branches 2½—5 μ in diam. which are bearing the sporocladia. Sporocladia shortly stipitate, sickleshaped, recurved, sometimes nearly horizontal, 3—5 septate, 20—24 × 4—5 μ, stipe 1 celled, 5—6 × 2—3 μ. Apical cell sterile. Phialides in 4—5 rows on the under surface, elliptic 2—4 × 1½—2 μ. Conidia fusoid 8—11½ × 2—3 μ.

Java, Bogor, on a white species of *Isaria,* on rabbit dung.

Coemansia erecta Bainer Bull. Soc. Myc. France **22**. 220. 1906.

Colonies sulphur yellow, 1—2 mm high. Conidiophores septate, 8—16 μ in diam. near the base; above mostly furcate or bifurcate, the branches 5½—9 μ in diam. and bearing the sporocladia. Sporocladia stalked, straight curved upwards and nearly parallel with the supporting hypha, 5—9 septate, 26—37 × 4—6 μ, stipe one celled 4—8 × 3—4 μ. Terminal cell sterile. Phialides elliptic, in about 5 oblique rows 3—5 × 1½—2 μ. Conidia subcylindric 9—10½ × 2—2½ μ.

Java, Tjampea, in a cave upon the excrements of bats.

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Uredinales found in the Daisetsuzan National Park Hokkaido, Japan*).

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Introduction.

On August 3, 1925, Naohide Hiratsuka, the senior writer climbed Mt. Kuro-dake, a eastern peak of the Daisetsuzan Mountain Range from Sôunkyô (Sôunbetsu), and spent several days in the shed near the top for study of the mycological flora of the Daisetsuzan Range. During his excursion, he collected many specimens of rust fungi, including many interesting species. It seems to be the first collection of the rust fungi from the Daisetsuzan National Park.

The first account of rust fungi from this National Park was made by the senior writer in his paper, entitled, „On two species of *Coleosporium* parasitic on the Japanese Compositae." in 1927. He reported a species of *Coleosporium, Coleosporium saussureae* Thümen on *Pinus pumila* Rgl. (0,I) and *Saussurea riederi* Herd. (II, III), based upon specimens which were collected by himself on the eastern slope of the alpine meadow near the summit of Mt. Kuro-dake. Since that time, there are 18 genera and 72 species of rust fungi which have been recorded by Ito & Homma (*23*), Ito & Murayama (*24*), Kamei (*25—27*) and the senior writer (*2—22*) from this National Park.

The materials described in the present work are, besides a number of collections made by Kingo Miyabe, Seiya Ito, Senji Kamei, Yoshio Tokunaga, Mitsuo Okamoto and the senior writer (1925—33), those made by the writers in October, 1957 and July of the next year, and by the junior writer in October of the same year. The number of specimens totals more than four hundred, amongst which are included 121 species. The following table shows the number of species, by genera, heretofore known from the Daisetsuzan National Park.

As shown in the table, there are 21 genera and 121 species including 5 species of the two form-genera, *Aecidium* and *Uredo,* which were found in the Daisetsuzan National Park.

*) Contributions from Laboratories of Phytopathology & Mycology, Faculty of Agriculture, Tokyo University of Education. No. 38.

The specimens studied are all kept in the Hiratsuka Herbarium, Tokyo, Japan.

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Table 1. Number of species of rust fungi found in the Daisetsuzan National Park, Hokkaido.

Families	Genera	Number of species		
		Previously reported	Present additions	Total
Melampsoraceae	Uredinopsis	5	1	6
	Milesina	1	2	3
	Hyalopsora	2	—	2
	Melampsoridium	3	—	3
	Melampsorella	1	—	1
	Pucciniastrum	5	1	6
	Thekopsora	6	—	6
	Calyptospora	1	—	1
	Melampsora	3	1	4
	Chnoopsora	1	—	1
	Chrysomyxa	9	—	9
	Cronartium	1	—	1
	Coleosporium	3	3	6
	Pucciniostele	—	1	1
Pucciniaceae	Phragmidium	8	—	8
	Triphragmium	—	1	1
	Xenodochus	1	—	1
	Uromyces	5	5	10
	Puccinia	24	22	46
Uredinales Imperfecti	Aecidium	—	2	2
	Uredo	2	1	3
Total		81	40	121

Fam. *Melampsoraceae.*

1. *Uredinopsis adianti* Komarov in Jaczewski, Komarov et Tranzschel, Fung. Ross. exsicc. no. 278, 1899. (Hiratsuka, f. in Mem. Tottori Agric. Coll. IV, p. 78, 1936).

Hab. II, III. on *Adiantum pedatum* L. (*Kujyaku-shida*). Sôunkyô (Sôunbetsu) (Sept. 9, 1926, N. H.).

2. *Uredinopsis filicina* Magnus in Atti Congr. Bot. Internaz. Genova (1892), p. 167, 1893. (Hiratsuka, f. in Mem. Tottori

Agric. Coll. IV, p. 50, 1936; Kamei in Jour. Facul. Agric. Hokkaido Imp. Univ. XLVII, p. 15, 1940).

Hab. II, III. on *Phegopteris polypodioides* Fée (*Dryopteris phegopteris* C. Chr.) (*Miyama-warabi*). Mt. Ishikari-dake (Aug. 3, 1932, Y. T.). Mt. Kuro-dake (Aug. 18, 1933, N. H.); Yukomanbetsu (Sept. 29 & Oct. 1, 1957, N. & Y. H.; July 20, 1958, N. & Y. H.); Lake-side of Shikaribetsu-numa (S. K.).

3. *Uredinopsis intermedia* Kamei in Transact. Sapporo Nat. Hist. Soc. XII, p. 166, 1932. (Hiratsuka, f. in Mem. Tottori Agric. Coll. IV. p. 71, 1936).

Hab. II, III. on *Athyrium acrostichoides* Diels. (*Miyama-shikeshida*). Mt. Kuro-dake (Sept. 9, 1926, N. H.).

4. *Uredinopsis ossiformis* Kamei in Transact. Sapporo Nat. Hist. Soc. XII, p. 167, 1932.

Hab. II, III. on *Dryopteris austriaca* Woynar, Schinz et Thellung (*Dryopteris dilatata* A. Gray) (*Shirane-warabi*). Lake-side of Shikaribetsu-numa (Sept. 30 & Oct. 1, 1929, S. K.).

5. Uredinopsis struthiopteridis Størmer ex Dietel in Ber. Deutsch. Bot. Ges. XIII, p. 331, 1895. (Hiratsuka, f. in Mem. Tottori Agric. Coll. IV, p. 58, 1936).

Hab. II, III. on *Matteuccia struthiopteris* Todaro (*Kusa-sotetsu*). Mt. Kuro-dake (Sept. 12, 1926, N. H.).

6. *Uredinopsis woodsiae* Kamei in Transact. Sapporo Nat. Hist. Soc. XII, p. 162, 1932. (Hiratsuka, f. in Mem. Tottori Agric. Coll. IV, p. 67, 1936).

Hab. II, III. on *Woodsia polystichoides* Eat. (*Iwa-denda*). Mt. Kuro-dake (Aug. 18, 1933, N. H.).

7. *Milesina jezoensis* Kamei et Hiratsuka, f. in Kamei in Transact. Sapporo Nat. Hist. Soc. XII, p. 32, fig. 1 (p. 28), fig. 2, c (p. 29), fig. 3 (p. 31), 1931. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. IV, p. 113, 1932; Mem. Tottori Agric. Coll. IV, p. 113, 1936; Mem. Facul. Agric. Tokyo Univ. Education. V, p. 45, 1958; Kamei in Jour. Facul. Agric. Hokkaido Imp. Univ. XLVII, p. 109, 1940).

Hab. II, III. on *Polypodium vulgare* L. (*Yezo-denda*). Mt. Kuro-dake (Aug. 19, 1925, July 26, 1926 & Aug. 18, 1933, N. H.); Lake-side of Shikaribetsu-numa (Sept. 30 & Oct. 1, 1929, June 6, 1930 & June 11, 1931, S. K.).

8. *Milesina miyabei* Kamei in Transact. Sapporo Nat. Hist. Soc. XII, p. 169, 1932.

Hab. II, III. on *Dryopteris crassirhizoma* Nakai (*O-shida*). Lake-side of Shikaribetsu-numa (Sept. 30, 1929, S. K.).

9. *Milesina sublevis* (Faull) Hiratsuka, f. in Mem. Tottori Agric. Coll. IV, p. 111 & pl. III, fig. 6, 1936.

Hab. II, III. on *Phyllitis scolopendrium* Newm. (*Scolopendrium*

vulgare Sm.) (*Ko-taniwatari*). Lake-side of Shikaribetsu-numa June 11, 1931, S. K.).

10. *Hyalopsora aculeata* Kamei in Transact. Sapporo Nat. Hist. Soc. XII, p. 128 & figs. 1—3, 1932. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. IV, p. 111, 1932).

Hab. II, III. on *Blechnum nipponicum* Mak. (*Blechnum spicant* Wither. var. *nipponicum* Miyabe et Kudo, *Spicantopsis nipponica* Nakai var. *japonica* Nakai) (*Shishigashira*). Pankenikoro (July 9, 1925, N. H.); Tenninkyô-Yukomanbetsu (July 18, 1958, N. & Y. H.).

11. *Hyalopsora hakodatensis* Hiratsuka, f., Monogr. Pucciniastr., p. 171, 1936.

Syn. *Hyalopsora hakodatensis* Hiratsuka, f. in Hiratsuka, f. & Uemura in Transact. Tottori Soc. Agric. Sci. IV, p. 20 & 25 & fig. 2, 1932. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. IV, p. 112, 1932; Mem. Tottori Agric. Coll. IV, p. 171, 1936).

Hab. II, III. on *Athyrium acrostichoides* Diels. (*Miyama-shikeshida*). Mt. Kuro-dake (Aug. 4, 1925 & Aug. 18, 1933, N. H.).

12. *Melampsoridium alni* (Thüm.) Dietel in Engler-Prantl, Natürl. Pflanzenfam. I, 1. Abt.*), p. 551, 1900). (Hiratsuka, f. in Mem. Tottori Agric. Coll. III, p. 210, 1935; IV, p. 181, 1936).

Hab. II, III. on *Alnus maximowiczii* Call. (*Alnus alnobetula* Hartig var. *fruticosa* Winkl.) (*Miyama-hannoki*). Sôunkyô (Sôunkei) (Sept. 13, 1926, N. H.; Sept. 10, 1927, Naoharu Hiratsuka); Lake-side of Shikaribetsu-numa (Sept. 30, 1929, Y. T.).

13. *Melampsoridium betulinum* (Fries) Klebahn in Zeitschr. f. Pflanzenkr. IX, p. 22, 1899. (Hiratsuka, f. in Mem. Tottori Agric. Coll. IV, p. 185, 1936).

Hab. II, III. on *Betula ermanii* Cham. var. *acutifolia* Winkl. (*Ye-zo-dakekamba*). Aizankei (Sept. 28 & 29, 1957, N. & Y. H.); Yukomanbetsu (Oct. 1, 1957, N. & Y. H.); Sôunkyô (July 22, 1958, N. & Y. H.).

II, III. on *Betula maximowicziana* Rgl. (*Udai-kamba*). Sôunkyô (Sôunkei) (Aug. 11, 1927, N. H.).

II, III. on *Betula tauschii* Koidz. (*Betula japonica* Sieb.) (*Shirakamba*). Sôunkyô (Sôunkei) (Sept. 10, 1927, Naoharu Hiratsuka).

14. *Melampsoridium hiratsukanum* S. Ito ex Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 9, 1927. (Hiratsuka, f. in Mem. Tottori Agric. Coll. IV, p. 194, 1936).

Hab. II, III. on *Alnus tinctoria* Sarg. var. *obtusiloba* Call. (*Yamahannoki*). Sôunkyô (Sôunkei, Sôunbetsu) (July 26, 1926 & Aug. 11,

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*) The following abbreviations are used for the name of the collectors of fungi mostly frequently named in the list: K. M. = Kingo Miyabe; S. I. = Seiya Ito; N. H. = Naohide Hiratsuka; Y. H. = Yasuyuki Hiratsuka; S. Iw. = Satoru Iwadare; M. O. = Mitsuo Okamoto; Y. T. = Yoshio Tokunaga; S. K. = Senji Kamei.

1927, N. H.); Lake-side of Shikaribetsu-numa (Sept. 30, 1929, Y. T.); Yukomanbetsu (Oct. 1, 1957, N. & Y. H.); Aizankei (Sept. 29, 1957, N. & Y. H.).

II, III. on *Alnus tinctoria* Sarg. var. *velutina* Hara (*Ke-yama-hannoki*). Nukabira (Oct. 11, 1958, Y. H.).

15. *Melampsorella caryophyllacearum* Schröter in Hedwigia. XIII, p. 85, 1874. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 299, 1927; Mem. Tottori Agric. Coll. IV, p. 202, 1936).

Syn. *Melampsorella elatina* (Alb. et Schw.) Arthur (Hiratsuka, f. in Bot. & Zool. V, p. 159, 1930).

Hab. 0, I. on *Abies mayriana* Miyabe et Kudo (*Ao-todomatsu*). Sôunkyô (July 22, 1958, N. & Y. H.).

II, III. on *Cerastium vulgatum* L. var. *glandulosum* Rgl. (*Mimi-nagusa).* Mt. Kuro-dake (Aug. 5, 1925, N. H.); Lake-side of Shikaribetsu-numa (July 7, 1925, N. H.).

II, III. on *Stellaria fenzlii* Rgl. (*Stellaria yezoensis* Maxim.) (*Yezo-hakobe*). Mt. Kuro-dake (Aug. 18, 1933, N. H.).

16. *Pucciniastrum agrimoniae* (Diet.) Tranzschel in Script. Bot. Hort. Univ. Petropol. IV, p. 301, 1895.

Hab. II, III. on *Agrimonia pilosa* Ledeb. (*Kin-mizuhiki*). Sôunkyô (Sôunbetsu) (Sept. 12. 1926, N. H.).

17. *Pucciniastrum circaeae* (Wint.) Spegazzini ex De Toni in Saccardo, Syll. Fung. VII, p. 763, 1888. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 303, 1927; Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 25 & 74, 1927; Bot. Mag. Tokyo. XLIV, p. 268, 1930; Mem. Tottori Agric. Coll. IV, p. 251, 1936).

Hab. II, III. on *Circaea alpina* L. (*Miyama-tanitade*). Mt. Kuro-dake (Aug. 4 & 18, 1925 & Sept. 12, 1926, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Sôunkyô (Sôunkei) (Aug. 17, 1925, N. H.); Mt. Hakuun-dake (Aug. 5, 1925, N. H.).

18. *Pucciniastrum hydrangeae-petiolaris* Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 27 & 93, 1927. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 306, 1927; Bot. Mag. Tokyo. XLIV, p. 277, 1930; Mem. Tottori Agric. Coll. IV, p. 245, 1936).

Hab. II, III. on *Hydrangea petiolaris* Sieb. et Zucc. (*Hydrangea scandens* Maxim.) (*Tsuru-ajisai*). Mt. Kuro-dake (Aug. 4, 1925 & Sept. 12, 1926, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.; Aug. 19, 1925, K. M. & N. H.); Sôunkyô (Sôunkei, Sôunbetsu) (Aug. 17, 1925, K. M. & N. H.).

19. *Pucciniastrum miyabeanum* Hiratsuka in Bot. Mag. Tokyo. XII, p. 33, 1898. (Hiratsuka, f. in Bot. Mag. Tokyo. XLIV, p. 264, 1930; Mem. Tottori Agric. Coll. IV, p. 271, 1936).

Hab. II, III. on *Viburnum furcatum* Bl. (*Mushikari*). Aizankei (Sept. 28, 1957, N. & Y. H.); Yukomanbetsu (Oct. 1, 1957, N. & Y. H.); Mt. Kuro-dake (Sept. 12, 1926, N. H.).

20. *Pucciniastrum potentillae* Komarov in Jaczewski, Komarov et Tranzschel, Fung. Ross. exsicc. no. 327, 1899. (Hiratsuka, f. in Bot. Mag. Tokyo. XLIV, p. 275, 1930; Mem. Tottori Agric. Coll. IV, p. 237, 1936).

Hab. II, III. on *Potentilla fragarioides* L. (*Kijimushiro*). Lake-side of Shikaribetsu-numa (July 6, 1925, N. H.); Pankenikoro (July 9, 1925, N. H.).

II, III. on *Potentilla freyniana* Bornn. (*Mitsuba-tsuchiguri*). Mt. Kuro-dake (Aug. 18, 1925, K. M. & N. H.).

21. *Pucciniastrum pyrolae* Dietel ex Arthur in N. Amer. Fl. VII, p. 108, 1907.

Syn. *Pucciniastrum pyrolae* Schröter ex Hiratsuka, f. in Mem. Tottori Agric. Coll. IV, p. 219, 1936.

Hab. II, III. on *Pirola renifolia* Maxim. (*Jinyô-ichiyakusô*). Mt. Kuro-dake (Aug. 18, 1925, K. M. & N. H.).

II, III. on *Pirola sp.* Sôunkyô (July 22, 1958, N. & Y. H.).

22. *Thekopsora areolata* (Fr.) Magnus in Sitzungsber. d. Ges. Nat. Freunde zu Berlin (1875). p. 58, 1875. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 309, 1927; Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 14, 1927; Bot. Mag. Tokyo. XLIII, p. 19, 1929; Mem. Tottori Agric. Coll. IV, p. 297, 1936).

Hab. II, III. on *Prunus ssiori* Fr. Schm. (*Shûri-zakura*). Sôunkyô (Sôunbetsu) (Sept. 13, 1926, N. H.; Sept. 10, 1927, Naoharu Hiratsuka); Lake-side of Shikaribetsu-numa (Aug. 30, 1929, S. K.); Aizankei (Sept. 29, 1957, N. & Y. H.).

23. *Thekopsora guttata* (Schröt.) Sydow, Monogr. Ured. III, p. 467, 1915. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 307, 1927; Bot. Mag. Tokyo. XLIII, p. 14, 1929; Mem. Tottori Agric. Coll. IV, p. 320, 1936).

Hab. II, III. on *Galium trifloriforme* Kom. (*Kuruma-mugura*). Mt. Kuro-dake (Aug. 18 & Sept. 12, 1925; Sept. 12, 1926, N. H.); Pankekinaushi (Oct. 17, 1925, M. O.).

24. *Thekopsora menziesiae* Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 22, 1927; Mem. Tottori Agric. Coll. IV, p. 292, 1936.

Hab. II, III. on *Menziesia pentandra* Maxim. (*Ko-yôraku*). Mt. Kuro-dake (Aug. 18, 1933, N. H.); Aizankei (Sept. 29, 1957, N. & Y. H.).

25. *Thekopsora sparsa* (Wint.) Magnus in Dalla Torre & Sarnth., Fl. Tirol. III, p. 118, 1905. (Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 24, 1927; Jap. Jour. Bot. III, p. 308, 1927; Bot. Mag. Tokyo. XLIII, p. 19, 1929; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 136 & 213, 1935; IV, p. 286, 1936).

Hab. II, III. on *Arctous japonicus* Nakai (*Kuma-kokemomo*). Mt. Kuro-dake (Sept. 11, 1926, N. H.).

26. *Thekopsora tripetaleiae* Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 23, 1927. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 308, 1927; Bot. Mag. Tokyo. XLIII, p. 18, 1929; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 136 & 213, 1935; IV, p. 290, 1936).

Hab. II, III. on *Tripetaleia bracteata* Maxim. (*Miyama-hotsutsu-ji*). Mt. Kuro-dake (Sept. 12, 1926, N. H.).

27. *Thekopsora vaccinii* (Wint.) Hiratsuka, f., Uredinolog. Stud., p. 260, 1955.

Syn. *Thekopsora myrtillina* Karsten, Myc. Fenn. IV, p. 59, 1879. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 309, 1927; Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 19, 1927; Bot. Mag. Tokyo. XLIII, p. 16, 1929; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 136 & 212, 1935; IV, p. 306, 1936).

Thekopsora vacciniorum Karsten, Myc. Fenn. IV, p. 58, 1879. (Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 20, 1927; Jap. Jour. Bot. III, p. 309, 1927; Bot. Mag. Tokyo. XLIII, p. 15, 1929; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 137 & 214, 1935; IV, p. 325, 1936).

Hab. II, III. on *Vaccinium axillare* Nakai (*Kuro-usugo*). Mt. Kuro dake) (Aug. 18, 1933, N. H.).

II, III. on *Vaccinium chamissonis* Bong. (*Yezo-kurousugo*). Mt. Kuro-dake (Aug. 18, 1933, N. H.).

II, III. on *Vaccinium smallii* A. Gray (*Ôba-sunoki*). Mt. Kuro-dake (Aug. 18, 1933, N. H.).

II, III. on *Vaccinium uliginosum* L. (*Kuromame-no-ki*). Mt. Kuro-dake (Aug. 12, 1927, S. I., N. H. & S. Iw.; Aug. 18, 1933, N. H.); Mt. Aka-dake (Aug. 14, 1927, S. I., N. H. & S. Iw.); Kumonotaira (Sept. 10 & 11, 1926, N. H.); Daifunkakô (Aug. 13, 1927, S. I., N. H. & S. Iw.); Mt. Nisekaushuppe (Aug. 28, 1929, M. O.).

II, III. on *Vaccinium vitis-idaea* L. (*Kokemomo*). Mt. Kuro-dake (Aug. 18, 1933, N. H.); Kumonotaira (Sept. 11, 1926, N. H.); Mt. Hakuun-dake (Aug. 14, 1927, S. I., N. H. & S. Iw.); Mt. Ushiroasahi-dake (Aug. 13, 1927, S. I., N. H. & S. Iw.).

28. *Calyptospora goeppertiana* Kühn in Hedwigia. VIII, p. 81, 1869. (Hiratsuka, f. in Jour. Jap. Bot. IX, p. 277, 1933; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 137 & 216, 1935; IV, p. 329, 1936).

Hab. III. on *Vaccinium vitis-idaea* L. (*Kokemomo*). Mt. Hakuun-dake (Aug. 18, 1933, N. H.); Mt. Upepesanke (April 9, 1929, Y. T.).

29. *Melampsora hypericorum* Schröter in Brand- u. Rostpilze Schles. p. 26, 1869. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 291, 1927).

Hab. I, III. on *Hypericum erectum* Thunb. (*Otogirisô*). Sôunkyô (Sôunbetsu) (Aug. 3, 1925, N. H.).

30. *Melampsora kusanoi* Dietel in Bot. Jahrb. XXXVII, p. 104, 1905. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 291, 1927; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 135 & 207, 1935).

Hab. I, II, III. on *Hypericum kamtschaticum* Ledeb. var. *typicum* Y. Kimura (*Hai-otogiri*). Mt. Kuro-dake (Aug. 18, 1925, N. H.; Aug. 19, 1925, K. M. & N. H.); Goshikitaira (Aug. 12, 1927, S. I., N. H. & S. Iw.).

31. *Melampsora larici-caprae arum* Klebahn in Forstl. Naturw. Zeitschr. VI, p. 467, 1897.

Hab. II, III. on *Salix bakko* Kimura (*Bakko-yanagi*). Aizankei (Sept. 29, 1957, N. & Y. H.).

32. *Melampsora larici-epitea* Klebahn in Zeitschr. f. Pflanzenkr. IX, p. 88, 1899. (Hiratsuka, f in Jap. Jour. Bot. III, p. 294, 1927).

Hab. II, III. on *Salix viminalis* L. var. *yezoensis* C. K. Schn. (*Kinu-yanagi*). Sôunkyô (Sôunkei) (Sept. 13, 1926, N. H.); Aizankei (Sept. 29, 1957, N. & Y. H.).

33. *Chnoopsora itoana* Hiratsuka, f. in Jap. Jour. Bot. III, p. 287, 1927. (Hiratsuka, f. in Mem. Tottori Agric. Coll. III, p. 136 & 208, 1935).

Hab. III. on *Oxalis acetosella* L. (*Ko-miyama-katabami*). Mt. Kuro-dake (Aug. 4, 1925 & July 26, 1926, N. H.; Aug. 17, 1925, K. M. & N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Sôunkyô (Sôunbetsu) (July 26, 1926, N. H.; July 22, 1958, N. & Y. H.); Pankenikoro (July 9, 1925, N. H.); Tenninkyô-Yukomanbetsu (July 18, 1958, N. & Y. H.); Yukomanbetsu (July 20, 1958, N. & Y. H.); Yukomanbetsu-Sugataminoike (July 21, 1958, N. & Y. H.).

34. *Chrysomyxa abietis* (Wallr.) Unger in Beitr. z. vergl. Path. p. 24 & figs. 1—8, 1840. (Hiratsuka, f. in Bot. Mag. Tokyo. XLIII, p. 476, 1929).

Hab. III. on *Picea glehni* Mast. (*Aka-todomatsu*). Mt. Nupukaushi (June 6, 1925, N. H.).

35. *Chrysomyxa empteri* Schröter ex Jørstad in Kgl. Norske Vidensk. Selsk. Skr. XXXVIII, p. 51, 1936.

Syn. *Chrysomyxa empteri* Schröter, Pilze Schles. I, p. 372, 1887. (Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 33, 1927; Jap. Jour. Bot. III, p. 316, 1927; Bot. Mag. Tokyo. XLIII, p. 475, 1929; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 137 & 217, 1935).

Hab. II, III. on *Empetrum nigrum* L. (*Gankôran*). Mt. Kuro-dake (July 28, 1926, S. I. & N. H.); Lake-side of Shikaribetsu-numa (July 7, 1925, N. H.).

36. *Chrysomyxa expansa* Dietel in Bot. Jahrb. XXVIII, p. 287, 1900. (Hiratsuka, f. in Bot. Mag. Tokyo. XLIII, p. 472, 1929; Mem. Tottori Agric. Coll. III, p. 217, 1935).

Hab. III. on *Rhododendron fauriae* Franch. var. *roseum* Nakai (*Yezo-shakunage*). Mt. Kuro-dake (July 26, 1926 & July 5, 1928, N. H.); Sôunkyô (July 22, 1958, N. & Y. H.); Lake-side of Shikaribetsu-numa (July 6, 1925, N. H.); Mt. Upepesanke (Oct. 11, 1958, Y. H.).

37. *Chrysomyxa ledi* De Bary in Bot. Zeitg. XXXVII, p. 809 & pl. X, figs. 7 & 8, 1879. (Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 34, 1927; Jap. Jour. Bot. III, p. 315, 1927; Bot. Mag. Tokyo. XLIII, p. 468, 1929; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 137 & 217, 1935).

Hab. II, III. on *Ledum palustre* L. var. *yezoense* Nakai (*Yezo-isotsutsuji*). Mt. Kuro-dake (Aug. 5, 1925, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Hakuun-sawa (Aug. 14, 1927, S. I., N. H. & S. Iw.).

II, III. on *Ledum palustre* L. var. *dilatatum* Wahl. (*Karafuto-isotsutsuji*). Mt. Nupukaushi (June 6, 1925, N. H.); Lake-side of Shikaribetsu-numa (June 6, 1925, N. H.); Tenninkyô-Yukomanbetsu (July 18, 1958, N. & Y. H.).

38. *Chrysomyxa ledicola* Lagerheim in Tromsö Mus. Aarsh. XVI, p. 119, 1893. (Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 35, 1927; Jap. Jour. Bot. III, p. 315, 1927; Bot. Mag. Tokyo. XLIII, p. 469, 1929; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 138 & 218, 1935).

Hab. II, III. on *Ledum palustre* L. var. *procumbens* Ait. (*Hime-isotsutsuji*). Mt. Hokkai-dake (Aug. 19, 1925, K. M. & N. H.; Aug. 4, 1925, N. H.); Mt. Hakuun-dake (Aug. 4, 1925, N. H.); Mt. Kuro-dake (Aug. 4, 1925, N. H.; July, 1928, H. Kataoka; July 28, 1926, S. I. & N. H.; Aug. 18, 1925, K. M. & N. H.); Kumonotaira (Aug. 19, 1925, K. M. & N. H.; July 28, 1926, S. I. & N. H.).

39. *Chrysomyxa pirolae* Rostrup in Bot. Centralbl. V, p. 127, 1881. (Hiratsuka, f. in Bot. Mag. Tokyo. XLIII, p. 474, 1929).

Hab. II, III. on *Pirola media* Sw. (*Maruba-no-ichiyakusô*). Mt. Nupukaushi (June 6, 1925, N. H.).

40. *Chrysomyxa ramischiae* Lagerheim in Svensk. Bot. Tidskr. III, p. 26 & figs. 1 & 3, 1909. (Hiratsuka, f. in Jap. Jour. Bot. III, p. 314, 1927; Bot. Mag. Tokyo. XLIII, p. 475, 1929).

Hab. II, III. on *Pirola secunda* L. (*Yamaichiyakusô*). Lake-side of Shikaribetsu-numa (June 6, 1925, N. H.).

41. *Chrysomyxa rhododendri* De Bary in Bot. Zeitg. XXXVII, p. 809 & pl. X, figs. 1—6, 1879. (Hiratsuka, f. in Bot. Mag. Tokyo. XLIII, p. 470, 1929).

Hab. II, III. on *Rhododendron davuricum* L. (*Yezo-murasaki-tsutsuji*). Lake-side of Shikaribetsu-numa (July 7, 1925, N. H.).

42. *Chrysomyxa succinea* (Sacc.) Tranzschel, Conspect. Ured. URSS. p. 314, 1939.

Syn. *Chrysomyxa alpina* Hiratsuka, f. in Bot. Mag. Tokyo. XLIII, p. 471, 1929. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. IV, p. 114, 1932; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 137 & 216, 1935).

Chrysomyxa expansa (non Dietel) (Hiratsuka, f. in Jap. Jour. Bot. III, p. 314, 1927; Mem. Tottori Agric. Coll. III, p. 137, 1935).

Hab. II, III. on *Rhododendron chrysanthum* Pall. (*Kibana-shakunage*). Mt. Kuro-dake (July 26, 1926, S. I. & N. H.; Aug. 4, 1925, N. H.; Aug. 18, 1933, N. H.); Mt. Eboshi-dake (Aug. 5, 1925, N. H.); Kumonotaira (Aug. 4, 1925 & July 5, 1928, N. H.; July 27, 1926, S. I. & N. H.); Mt. Hakuun-dake (Aug. 5, 1925, N. H.); Mt. Goshiki-dake (Aug. 14, 1927, S. I., N. H. & S. Iw.); Yukomanbetsu-Sugataminoike (July 21, 1958, N. & Y. H.).

43. *Cronartium kamtschaticum* Jørstad in Skrift. utgitt av Det Norske Videnskaps-Akad. 1 Oslo. I. Matem.-Nat. Kl. no. 8 (1933), p. 27, 1934. (Hiratsuka, f. in Mem. Tottori Agric. Coll. III, p. 138 & 218, 1935).

Syn. *Cronartium pedicularis* (non Lindr.) (Hiratsuka, f. in Bot. & Zool. II, p. 546, 1934).

Hab. O, I. on *Pinus pumila* Rgl. (*Hai-matsu*). Mt. Kuro-dake (July 26, 1926, S. I. & N. H.); Kumonotaira (July 27, 1926, N. H.); Yukomanbetsu-Sugataminoike (July 21, 1958, N. & Y. H.).

II, III. on *Pedicularis euphrasioides* Steph. (*Chishima-shiogama*). Hakuun-sawa (Aug. 14, 1927, S. I., N. H. & S. Iw.).

44. *Coleosporium fauriae* Sydow in Ann. Myc. XII, p. 160, 1914. (Hiratsuka, f. in Mem. Tottori Agric. Coll. III, p. 220, 1935).

Hab. II, III. on *Fauria crista-galli* Mak. (*Iwa-ichô*). Mt. Chûbetsu-dake (Aug. 19, 1931, M. O.); Mt. Tomuraushi (Aug. 1927, H. Kataoka).

45. *Coleosporium petasitis* Léveillé ex Cooke, Handb. Brit. Fungi, p. 521.

Hab. II, III. on *Petasites japonicus* Maxim. var. *giganteus* Hort. (*Akita-buki*). Nukabira (Oct. 11, 1958, Y. H.).

46. *Coleosporium phellodendri* Komarov in Jaczewski, Komarov et Tranzschel, Fung. Ross. exsicc. no. 274, 1899.

Hab. II, III. on *Phellodendron lavallei* Dode (*Kihada*). Aizankei (Sept. 28, 1957, N. & Y. H.); Mt. Upepesanke (Oct. 11, 1958, Y. H.).

47. *Coleosporium pinicola* (Arth.) Jackson in Mem. Torrey Bot. Club. XVIII, p. 81, 1931.

Syn. *Coleosporium pini* Galloway in Jour. Myc. VII, p. 44, 1891 (non *Coleosporium pini* Lagerheim, 1889); Saccardo, Syll. Fung. XI, p. 208.

Gallowaya pini Arthur in Résult. Sci. Congr. Bot. Internat. Vienne (1905). p. 336, 1906; N. Amer. Fl. VII, p. 95, 1907; Sydow, Monogr. Ured. III, p. 657 & pl. XXX, fig. 188, 1915.

Gallowaya pinicola Arthur in Bull. Torrey Bot. Club. XLVII, p. 36, 1921; N. Amer. Fl. VII, p. 661, 1925.

Coleosporium pinicola Arthur, Manual of rusts in United States and Canada. p. 46 & fig. 67, 1934.

Hab. III. on *Pinus pumila* Rgl. (*Hai-matsu*). Yukomanbetsu-Sugataminoike (July 21, 1958, N. & Y. H.).

The present species is new to Japan.

48. *Coleosporium saussureae* Thümen in Bull. Soc. Imp. Nat. Moscou. LV, p. 212, 1880. (Hiratsuka, f. in Transact. Sapporo Nat. Hist. Soc. IX, p. 222, 1927; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 138 & 220, 1935).

Syn. *Coleosporium taisetsuensis* S. Ito et Homma in Transact. Sapporo Nat. Hist. Soc. XV, p. 118, 1938.

Hab. O, I. on *Pinus pumila* Rgl. (*Hai-matsu*). Mt. Kuro-dake (July 26, 1926, S. I. & N. H.).

II, III. on *Saussurea riederi* Herd. (*Kita-azami*). Mt. Kuro-dake (Aug. 4, 1925 & Sept. 12, 1926, N. H.; Aug. 19, 1925, K. M. & N. H.); Goshiki-taira (Aug. 11, 1927, S. I., N. H. & S. Iw.); Yukinosawa (Sept. 11, 1926, N. H.); Mt. Nisekauslupe (Aug. 12, 1929, M. O.).

II, III. on *Saussurea tilesii* Ledeb. var. *nivea* Koidz. (*Yukibatôhiren*). Mt. Kuro-dake (Aug. 12, 1927, S. I., N. H. & S. Iw.).

49. *Coleosporium senecionis* Fries, Summa Veg. Scand. p. 512. 1849.

Hab. II, III. on *Senecio cannabifolius* Less. (*Hangonsô*). Yukomanbetsu (Oct. 1, 1957, N. & Y. H.).

50. *Pucciniostele clarkiana* (Barcl.) Dietel in Bot. Jahrb. XXVII, p. 564, 1899.

Hab. I, III. on *Astilbe thunbergii* Miq. var. *congesta* Boiss. (*Toriashishôma*). Tenninkyô-Yukomanbetsu (July 18, 1958, N. & Y. H.).

Fam. *Pucciniaceae.*

51. *Phragmidium alpinum* Hiratsuka, f. in Ann. Myc. XXVIII, p. 280, 1930. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Jap. Jour. Bot. VII, p. 244, 1935; Mem. Tottori Agric. Coll. III, p. 135 & 204, 1935).

Hab. III. on *Rubus pedatus* Sm. (*Kogane-ichigo*). Mt. Kuro-dake (Aug. 19, 1925 & Sept. 11, 1926, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Kumonotaira (Sept. 11, 1926, N. H.); Mt. Nisekaushuppe (Aug. 28, 1929, M. O.).

52. *Phragmidium fusiforme* Schröter, Brand- u. Rostpilze Schles. p. 24, 1872. (Hiratsuka, f. in Jap. Jour. Bot. VII, p. 250, 1935; Mem. Tottori Agric. Coll. III, p. 204, 1935).

Hab. 0, I, II, III. on *Rosa acicularis* Lindl. var. *gmelini* C. K. Schneid. (*Ô-takanebara*). Lake-side of Shikarabetsu-numa (July 6, 1925, N. H.).

53. *Phragmidium itoanum* Hiratsuka, f. in Transact. Sapporo Nat. Hist. Soc. XIII, p. 134, 1934. (Hiratsuka, f. in Bot. & Zool. II, p. 545, 1934; Jap. Jour. Bot. VII, p. 271, 1935; Mem. Tottori Agric. Coll. III, p. 135 & 204, 1935).

Hab. II, III. on *Potentilla matsumurae* Wolf. (*Miyama-kimbai*). Mt. Hokkai-dake (Sept. 11, 1926, N. H.); Kumonotaira (Aug. 19, 1925, K. M. & N. H.; Sept. 11, 1926, N. H.); Mt. Hakuun-dake (Aug. 5, 1925, N. H.); Hokkai-sawa (Aug. 14, 1927, S. I., N. H. & S. Iw.); Mt. Tomuraushi (Aug. 1927, H. Kataoka).

54. *Phragmidium miyabeanum* S. Ito et Hiratsuka, f. in Hiratsuka, f. in Ann. Myc. XXVIII, p. 279, 1930. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 546, 1934; Jap. Jour. Bot. VII, p. 258, 1935; Mem. Tottori Agric. Coll. III, p. 135 & 205, 1935).

Hab. III. on *Sieversia pentapetala* Greene (*Geum pentapetalum* Mak.) (*Chinguruma*). Kumonotaira (Aug. 19, 1925, K. M., N. H. & I. Tanaka; Sept. 11, 1926, N. H.); Mt. Kuro-dake (Sept. 12, 1926, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Mt. Hokkai-dake (Aug. 14, 1927, S. I., N. H. & S. Iw.); Mt. Kaun-dake (Aug. 26, 1932, Y. T.); Mt. Tomuraushi (Aug. 1927, H. Kataoka; Aug. 27, 1932, Y. T.).

55. *Phragmidium nambuanum* Dietel in Ann. Myc. VI, p. 227, 1908. (Hiratsuka, f. in Jap. Jour. Bot. VII, p. 239, 1935).

Hab. 0, I, II, III. on *Rubus kinashii* Lév. et Vnt. (*Rubus occidentale* var. *japonicus* Miyabe) (*Kuro-ichigo*). Sôunkyô (Sôunkei) (Aug. 16 1925, N. H.).

56. *Phragmidium pauciloculare* (Diet.) Sydow, Monogr. Ured. III, p. 138 & pl. VI, fig. 60, 1912. (Hiratsuka, f. in Jap. Jour. Bot. VII, p. 282, 1935).

Hab. 0, II, III. on *Rubus parvifolius* L. (*Rubus triphyllus* Thunb.) (*Nawashiro-ichigo*). Mt. Kuro-dake (Aug. 19, 1925, N. H.).

57. *Phragmidium rubi-idaei* (DC.) Karsten, Myc. Fenn. IV, p. 52, 1878. (Hiratsuka, f. in Jap. Jour. Bot. VII, p. 235, 1935).

Hab. 0, I, II, III. on *Rubus idaeus* L. var. *aculeatissimus* Rgl. et Til. (*Rubus idaeus* L. var. *strigosa* Maxim.) (*Yezo-ichigo*). Mt. Kuro-dake (Aug. 16, 1925 & Sept. 12, 1926, N. H.); Aizankei (Sept. 29, 1957, N. & Y. H.); Sôunkyô (July 22, 1958, N. & Y. H.); Yukomanbetsu (Oct. 1, 1957, N. & Y. H.; July 20, 1958, N. & Y. H.).

0, I, II, III. on *Rubus idaeus* L. var. *aculeatissimus* Rgl. et Til. forma *concolor* Ohwi (*Kanayama-ichigo*). Aizankei (Sept. 29, 1957, N. & Y. H.).

58. *Phragmidium rubi-japonici* Kasai in Transact. Sapporo Nat. Hist. Soc. III, p. 40 & pl. I, fig. 13, 1910. (Hiratsuka, f. in Ann. Myc. XXVIII, p. 280, 1930; Jap. Jour. Bot. VII, p. 231, 1935).

Hab. II, III. on *Rubus pseudo-japonicus* Koidz. (*Rubus japonicus* Auct.) (*Hime-goyoichigo*). Sôunkyô (Sôunbetsu, Sôunkei) (Aug. 17, 1925, N. H.).

59. *Triphragmium ulmariae* Link, Sp. Pl. (VI), 2, p. 84, 1825.

Hab. 0, I, III. on *Filipendula kamtschatica* Maxim. (*Oni-shimotsuke*). Yukomanbetsu (Oct. 1, 1957, N. & Y. H.).

60. *Xenodochus minor* Arthur in N. Amer. Fl. VII, p. 182, 1921. (Hiratsuka, f. in Jour. Jap. Bot. X, p. 130, 1934; Bot. & Zool. II, p. 546, 1934; Mem. Tottori Agric. Coll. III, p. 135 & 206, 1935).

Hab. III. on *Sanguisorba sitchensis* Trautv. et Mey. (*Takane-to-chiso*). Hakuun-sawa (Aug. 14, 1927, N. H.); Goshiki-sawa (Aug. 14, 1927, S. I., N. H. & S. Iw.).

61 *Uromyces amurensis* Komarov in Jaczewski, Komarov et Tranzschel, Fung. Ross. exsicc. nos. 157 & 158, 1899.

Hab. 0, I, II, III, on *Maackia amurensis* Rupr. et Maxim. var. *buergeri* Schneid. (*Inu-enjyu*). Yukomanbetsu (Sept. 29, 1957, N. & Y. H.).

62. *Uromyces cacaliae* (DC.) Unger, Einfl. Bod. Vert. Ges. p. 216, 1836. (Hiratsuka, f. in Bot. & Zool. II, p. 545, 1934; Transact. Tottori Soc. Agric. Sci. III, p. 216, 1931; Mem. Tottori Agric. Coll. III, p. 132, 1935).

Hab. III. on *Cacalia auriculata* DC. var. *bulbifera* Koidz. (*Komochi-mimikomori*). Mt. Kuro-dake (Aug. 4, 1925, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Mt. Hakuun-dake (Aug. 5, 1925, N. H.); Yukomanbetsu (July 20, 1958, N. & Y. H.); Sôunkyô (July 22, 1958, N. & Y. H.).

63. Uromyces japonicus Berkeley et Curtis in Proc. Amer. Acad. Arts & Sci. IV, p. 126, 1858. (Hiratsuka, f. in Mem. Tottori Agric. Coll. III, p. 185, 1935).

Hab. 0, I, III. on *Allium victorialis* L. (*Gyôjya-ninniku*). Sôunkyô (Sôunkei) (Aug. 3, 1925, N. H.); Mt. Kuro-dake (Aug. 4, 1925, N. H.); Lake-side of Shikaribetsu-numa (July 7, 1925, N. H.).

64. *Uromyces lespedezae-procumbentis* (Schw.) Curtis, Geol. Nat. Hist. Survey N. Car. III, p. 123, 1867.

Hab. 0, I, II, III. on *Lespedeza bicolor* Turcz. (*Yezo-yamahagi*). Sôunkyô (Sôunbetsu) (Aug. 15, 1925, N. H.).

65. *Uromyces lycoctoni* (Kalchbr.) Trotter, Fl. Ital. Crypt. Ured. p. 64, 1908.

Syn. *Uromyces aconiti* Fuckel, Symb. Myc. p. 61, 1869.

Hab. 0, I, III. on *Aconitum umbrosum* Kom. (*Ô-reijinsô*). Sôunkyô (Sôunbetsu) (Aug. 11, 1927, S. I., N. H. & S. Iw.; July 22, 1958, N. & Y. H.); Mt. Kuro-dake (Aug. 4, 5 & 18, 1925, July 26, 1926 & Aug. 18, 1933, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Tenninkyô-Yukomanbetsu (July 18, 1958, N. & Y. H.); Yukomanbetsu-Sugataminoike (July 21, 1958, N. & Y. H.); Penkenikoro (July 5, 1925, N. H.); Lake-side of Shikaribetsu-numa (July 7, 1925, N. H.).

66. *Uromyces peracarpae* S. Ito et Tochinai in S. Ito in Bot. Mag. Tokyo. XL, p. 278 & fig. 1 a, 1926. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 216, 1931; Mem. Tottori Agric. Coll. III, p. 186, 1935).

Hab. III. on *Peracarpa circaeoides* H. Feer *(Tani-gikyô*). Sôunkyô (Sôunkei) (July 22, 1958, N. & Y. H.); Mt. Kuro-dake (July 26, 1926. N. H.); Lake-side of Shikaribetesu-numa (July 7, 1925, N. H.).

67. *Uromyces rudbeckiae* Arthur et Holway in Bull. Iowa Agric. Coll. (1884). p. 154, 1885.

Hab. III. on *Solidago virgaurea* L. (*Akinokirinsô*). Tenninkyô-Yukomanbetsu (July 18, 1958, N. & Y. H.); Lake-side of Shikaribetsu-numa (July 7, 1925, N. H.).

68. *Uromyces solidaginis* (Sommerf.) Niessl in Verh. Nat.-Ver. Brünn. X, p. 163 & pl. III, fig. 10, 1872. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 216, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 132, 1935).

Hab. III. on *Solidago virgaurea* L. (*Akinokirinsô).* Mt. Kuro-dake (Aug. 12, 1927, S. I., N. H. & S. Iw.; Aug. 18, 1925, N. H.); Mt. Hokkai-dake (Sept. 11, 1926, N. H.); Yukinosawa (Sept. 11, 1926, N. H.); Kumonotaira (Aug. 19, 1925, N. H.); Mt. Hakuun-dake (July 28, 1926, N. H.); Mt. Ushiroasahi-dake (Aug. 13, 1927, S. I., N. H. & S. Iw.); Mt. Nisekaushuppe (Aug. 12, 1929, M. O.).

69. *Uromyces trifolii* (Hedw. f.) Léveillé in Ann. Sci. Nat. 3 sér. VIII, p. 371, 1847.

Syn. *Uromyces trifolii-repentis* Liro in Acta Soc. Fauna et Flora Fenn. XXIX, no. 6, p. 15, 1906.

Hab. 0, I, II, III. on *Trifolium repens* L. (*Shiro-tsumekusa*). Lake-side of Shikaribetsu-numa (July 6, 1925, N. H.; Oct. 10, 1958, Y. H.); Pankenikoro (July 8, 1925, N. H.).

70. *Uromyces veratri* Schröter in Abhandl. Schles. Ges. vaterl. Kult. XLVIII, p. 10, 1870.

Hab. II, III. on *Veratrum grandiflorum* Loes. f. (*Veratrum album* L. var. *grandiflorum* Maxim.) (*Baikeisô*).Sôunkyô (Sôunbetsu) (Aug. 4, 1925, N. H.); Pankenikoro (July 9, 1925, N. H.): Yukomanbetsu-Sugataminoike (July 21, 1958, N. & Y. H.).

71. *Puccinia absinthii* (Hedw. f.) De Candolle, Fl. Fr. VI, p. 56, 1815.

Hab. II, III. on *Artemisia montana* Pamp. (*ô-yomogi*). Sôunkyô (Sôunbetsu) (Aug. 17, 1925, N. H.; Oct., 1927, Naoharu Hiratsuka).

72. *Puccinia adoxae* Hedwig, f. ex De Candolle, Fl. Fr. II, p. 220, 1805. (Hiratsuka, f. in Ann. Myc. XXVIII, p. 278, 1930; Transact. Tottori Soc. Agric. Sci. III, p. 216, 1931).

Hab. III. on *Adoxa moschatellina* L. (*Renpukusô*). Sôunkyô (Sôunbetsu, Sôunkei) (July 26, 1926, S. I. & N. H.).

73. *Puccinia angelicae* Fuckel, Symb. Myc. p. 52, 1870.

Hab. II, III. on *Angelica refracta* Fr. Schm. (*Yezo-ôba-senkyû*). Yukomanbetsu (Oct. 1, 1957, N. & Y. H.); Mt. Kuro-dake (Aug. 18, 1925, N. H.).

74. *Puccinia arenariae* (Schum.) Winter in Hedwigia. XIX, p. 38, 1880.

Hab. III. on *Moehringia lateriflora* Fenzl. (*ôyamafusuma*). Sôunkyô (Sôunbetsu) (Sept. 13, 1926, N. H.).

75. *Puccinia artemisiae-keiskeanae* Miura ex Sydow in Ann. Myc. XI, p. 95 & fig. 1, 1913.

Hab. III. on *Artemisia keiskeana* Miq. (*Inu-yomogi*). Sôunkyô (Sôunbetsu) (Aug. 3, 1925, N. H.).

76. *Puccinia asperulae-odoratae* Wurth in Centralbl. Bakt. II. Abt. XIV, p. 314 & figs. 9—10, 1905.

Hab. 0, I, II, III. on *Asperula odorata* L. (*Kurumabasô*). Sôunkyô (Sôunkei) (Oct. 18, 1929, M. O.); Mt. Kuro-dake (Aug. 5, 1925, N. H.).

77. *Puccinia calthicola* Schröter in Beitr. Biol. Pfl. III, p. 61, 1879. (Hiratsuka, f. in Mem. Tottori Agric. Coll. III, p. 132 & 190, 1935).

Hab. 0, I, II, III. on *Caltha fistulosa* N. Schip. (*Yezo-ryûkinka*). Hokkai-sawa (Sept. 10, 1926, N. H.).

78. *Puccinia calumnata* Sydow in Ann. Myc. XI, p. 102, 1913. (Hiratsuka, f. in Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 132 & 190, 1935).

Hab. II, III. on *Pleuropteropyrum weyrichii* H. Gross. var. *alpicolum* Koidz. (*Takane-urajiro-itadori*). Mt. Kuro-dake (Sept. 12, 1926, N. H.); Hokkai-sawa (Sept. 11, 1926, N. H.).

79. *Puccinia campanulae* Carmichael ex Berkeley in Smith, Engl. Fl. V (pt. 20, p. 365, 1836.) (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 216, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 132 & 191, 1935).

Hab. III. on *Campanula lasiocarpa* Cham. (*Iwa-gikyô*). Mt. Ushiro-asahi-dake (Aug. 13, 1927, S. I., N. H. & S. Iw.); Hakuun-sawa (Aug. 14, 1927, S. I., N. H. & S. Iw.).

80. *Puccinia caricis* Rebentisch, Fl. Neomarch. p. 356, 1804.

Hab. 0, I. on *Urtica takeadana* Ohwi (*Yezo-irakusa*). Sôunkyô (July 22, 1958, N. & Y. H.).

81. *Puccinia chrysosplenii* Greville ex Berkeley in Smith, Engl. Fl. V (pt. 2), p. 367, 1836. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931).

Hab. III. on *Chrysosplenium flagelliferum* Fr. Schm. (*Tsurunekonomesô*). Sôunkyô (Sôunbetsu) (Aug. 16, 1925, N. H.); Mt. Kuro-dake (Aug. 18, 1925, N. H.).

82. *Puccinia circaeae* Persoon, Syn. Fung. p. 228, 1801. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 133 & 191, 1935).

Hab. III. on *Circaea alpina* L. (*Miyama-tanitade*). Sôunkyô (Sôunbetsu) (Aug. 3, 4, 17 & 18, 1925, N. H.); Mt. Kuro-dake (Aug. 12, 1925, K. M. & N. H.; Sept. 12, 1926 & Aug. 18, 1933, N. H.); Yukomanbetsu (Oct. 1, 1957 & July 20, 1958, N. & Y. H.).

83. *Puccinia epilobii* De Candolle in Fl. Fr. II, p. 221, 1805; VII, p. 61, 1815. (Hiratsuka, f. in Ann. Myc. XXVIII, p. 278, 1930; Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 133 & 191, 1935).

Hab. III. on *Epilobium hornemanii* Rchb. (*Yezo-miyama-akabana*). Hokkai-sawa (Aug. 19, 1925, K. M., N. H. & I. T.; Sept. 11, 1926, N. H.); Kumonotaira (Aug. 19, 1925, N. H.).

84. *Puccinia erythropus* Dietel in Bot. Jahrb. XXXVII, p. 101, 1905.

Hab. II, III. on *Miscanthus sinensis* Anders. (*Susuki*). Sôunkyô (Sôunbetsu) (Sept. 17, 1926, N. H.).

85. *Puccinia fusispora* Sydow, Monogr. Ured. I, p. 590 & fig. 448, 1903.

Hab. III. on *Urtica takeadana* Ohwi (*Yezo-irakusa*). Nukabira (Oct. 11, 1958, Y. H.).

86. *Puccinia hakkodensis* Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 241 & fig. 22, 1931.

Hab. III. on *Clintonia udensis* Trautv. et Mey. (*Tsubame-omoto*). Mt. Kuro-dake (Aug. 12, 1927, S. I., N. H. & S. Iw.; Sept. 12, 1926, N. H.); Aizankei (Sept. 29, 1957, N. & Y. H.).

87. *Puccinia haleniae* Arthur et Holway in Arthur in Bull. Geol. Nat. Survey Minn. III, p. 30, 1887.

Hab. III. on *Halenia corniculata* Cornaz. (*Hanaikari*). Lake-side of Shikaribetsu-numa (July 6, 1925, N. H.).

88. *Puccinia hieracii* Martius, Prodr. Fl. Mosq. 2 ed., p. 226, 1817.

Syn. *Puccinia picridis* Hazsl., Brand- u. Rostpilze Ungarns, p. 81, 1877.

Hab. II, III. on *Picris japonica* Thunb. (*Picris hieracioides* var. *japonica* Rgl.) (*Kôzorina*). Sôunkyô (Sôunbetsu) (Aug. 3, 1925, N. H.).

89. *Puccinia hultenii* Tranzschel et Jørstad in Jørstad in Skr. utgitt av Det Norske Vid.-Akad, Oslo. I. Matem.-Nat. Kl. no. 9, p. 107 & fig. 7, 1934. (Hiratsuka, f. in Jour. Jap. Bot. X, p. 620 & fig. 16, 1935; Mem. Tottori Agric. Coll. III, p. 133, 1935).

Syn. *Puccinia rumicis-scutati* (non Winter) (Hiratsuka, f. in Ann. Myc. XXVIII, p. 279, 1930; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 133 & 194, 1935).

Hab. II, III. on *Rumex arifolius* All. (*Rumex montanus* Desf.) (*Takane-suiba*). Mt. Kuro-dake (Aug. 3 & 18, 1925, Sept. 12, 1926 & Aug. 12, 1927, N. H.; July 12, 1927, S. I., N. H. & S. Iw.).

90. *Puccinia infra-aequatorialis* Jørstad in Skr. utgitt av Det Norske Vid, -Akad, Oslo. I. Matem.-Nat. Kl. (1933), no. 9, p. 132 & fig. 18, 1934.

Hab. II, III. on *Cirsium kamtschaticum* Ledeb. (*Chishima-azami*). Sôunkyô (Sôunbetsu) (Aug. 11, 1927, S. I., N. H. & S. Iw.); Mt. Kuro-dake (Sept. 12, 1926, N. H.).

91. *Puccinia lactucae-debilis* Dietel in Ann. Myc. VI, p. 225, 1908.

Hab. 0, I, II, III. on *Ixeris dentata* Nakai (*Lactuca dentata* Mak. var. *thunbergii* Mak.) (*Nigana*). Sôunkyô (Sôunbetsu) (Aug. 16, 1925, N. H.).

92. *Puccinia majanthemi* Dietel in Bot. Jahrb. XXVIII, p. 285, 1900. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 133 & 195, 1935).

Hab. III. on *Majanthemum dilatatum* Nels. et Macbr. (*Maizurusô*). Mt. Kuro-dake (Aug. 4, 1925, K. M. & N. H.); Lake-side of Shikaribetsu-numa (July 7, 1925, N. H.); Mt. Numanohara (Aug., 1927, H. Kataoka); Yukomanbetsu (July 20, 1958, N. & Y. H.).

III. on *Trillium kamtschaticum* Pall. (*Ôba-no-enreisô*). Lake-side of Shikaribetsu-numa (July 6, 1925, N. H.).

93. *Puccinia minussensis* Thümen in Bull. Soc. Imp. Nat. Moscou, LIII, p. 214, 1878.

Hab. 0, I, II, III. on *Lactuca raddeana* Maxim. (*Yama-nigana*). Sôunkyô (Sôunbetsu) (Aug. 17, 1925, N. H.).

94. *Puccinia miscanthi* Miura, Flora of Manchuria & E. Mongolia. III, p. 302, 1928.

Hab. 0, I. on *Plantago asiatica* L. (*Ôbako*). Sôunkyô (Sôunbetsu) (Aug. 3, 1925, N. H.).

95. *Puccinia nanbuana* Hennings in Hedwigia. XL, p. (26), 1901. (Hiratsuka, f. in Mem. Tottori Agric. Coll. III, p. 133 & 197, 1935).

Hab. II, III. on *Angelica edulis* Miyabe (*Amaniu*). Sôunkyô (Sôunbetsu) (Oct., 1927, Naoharu Hiratsuka).

II, III. on *Peucedanum multivittatum* Maxim. (*Hakusan-bofu*). Mt. Ushiroasahi-dake (Aug. 13, 1927, S. I., N. H. & S. Iw.).

96. *Puccinia nishidana* Hennings in Hedwigia. XL, p. (26), 1901.

Hab. II, III. on *Cirsium kamtschaticum* Ledeb. (*Chishima-azami*). Mt. Kuro-dake (Aug. 11, 1927, S. I., N. H. & S. Iw.); Aizankei (Sept. 29, 1957, N. & Y. H.); Sôunkyô (July 22, 1958, N. & Y. H.); Yukomanbetsu (Oct. 1, 1957, N. & Y. H.).

97. *Puccinia nolitangeris* Corda, Icon. Fung. IV, p. 16 & pl. V, fig. 57, 1840.

Hab. II, III. on *Impatiens noli-tangere* L. (*Kitsurifune*). Mt. Kuro-dake (July 26, 1926, N. H.); Sôunkyô (Sôunbetsu) (Aug. 3, 1925, N. H.).

98. *Puccinia osmorrhizae* Cooke et Peck in Rept. N. Y. State Mus. XXIX, p. 73, 1878.

Hab. III on *Osmorrhiza aristata* Mak. et Yabe (*Osmorrhiza japonica* Sieb. et Zucc.) (*Yabuninjin*). Aizankei (Sept. 29, 1957, N. & Y. H.).

99. *Puccinia phragmitis* (Schum.) Körnicke in Hedwigia. XV, p. 179, 1876.

Hab. II, III. on *Phragmites vulgaris* Trin. (*Kita-yoshi*). Yukomanbetsu (Oct. 1, 1957, N. & Y. H.).

100. *Puccinia poae-nemoralis* Otth in Mitt. Naturf. Ges. Bern (1870), p. 113, 1871.

Hab. II, III. on *Poa hakusanensis* Hack. (*Poa yezo-montana* Honda) (*Hakusan-ichigotsunagi*). Mt. Kuro-dake (Aug. 12, 1927, N. H.). *Poa hakusanensis* Hack. is a new host plant for the present fungus.

101. *Puccinia polygoni-amphibii* Persoon, Syn. Meth. Fung. p. 227, 1801.

Hab. II, III. on *Reynoutria sachalinensis* Nakai (*Polygonum sachalinense* Fr. Schm.) (*ô-itadori*). Sôunkyô (Sôunbetsu) (Aug. 20, 1925, N. H.; July 22, 1958, N. & Y. H.); Mt. Kuro-dake (Sept. 12, 1926, N. H.).

102. *Puccinia porphyrogenita* Curtis in Thümen, Myc. univ. no. 545, 1876. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 133 & 199, 1935).

Hab. III. on *Chamaepericlimenum canadense* Aschers. et Graebn. (*Cornus canadensis* L.) (*Gozentachibana*). Mt. Kuro-dake (Aug. 4, 1925, N. H.); Takanegahara (May 2, 1929, M. O.); Sôunkyô (Sôunkei) (Aug. 17, 1925, N. H.; July 22, 1958, N. & Y. H.); Mt. Nisekaushuppe (Aug. 29, 1929, M. O.); Lake-side of Shikaribetsu-numa (July 7, 1925, N. H.); Mt. Nupukaushi (July 7, 1925, N. H.); Mt. Upepesanke (Oct. 11, 1958, Y. H.).

103. *Puccinia punctata* Link in Ges. Nat. Freunde Berlin Mag. VII, p. 30, 1815.

Hab. 0, I, II, III. on *Galium verum* L. var. *leiocarpum* Ledeb. (*Kibana-no-kawaramatsuba*). Sôunkyô (Sôunbetsu) (Aug. 17, 1925, K. M., N. H. & I. Tanaka).

104. *Puccinia recondita* Roberge ex Desmazierés in Bull. Soc. Bot. Fr. IV, p. 798, 1857.

Syn. *Puccinia glyceriae* S. Ito in Jour. Coll. Agric. Tohoku Imp. Univ. (Sapporo). III, p. 200 & pl. XI, fig. 2, 1909. (Hiratsuka, f. in Jour. Jap. Bot. XV, p. 435, 1939).

Hab. II, III. on *Glyceria lithuanica* Lindm. (*Karafuto-dojyôtsu-nagi*). Mt. Kuro-dake (Aug. 4, 1925, N. H.).

105. *Puccinia saxifragae* Schlechtendal, Fl. Berol. II, p. 134, 1824. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 134 & 200, 1935).

Hab. III. on *Saxifraga fusca* Maxim. var. *divaricata* Franch. et Sav. (*Yezo-kurokumosô*). Mt. Kuro-dake (Aug. 5 & 18, 1925 & Sept. 12, 1926, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Sôunkyô (Sôunkei) (Aug. 3, 1925, N. H.; July 9, 1929, M. O.; July 22, 1958, N. & Y. H.); Yukomanbetsu (Oct. 1, 1957, N. & Y. H.); Horoka-tokachi (Aug. 9, 1925, M. O.).

III. on *Saxifraga japonica* Boiss. (*Fuki-yukinoshita*). Sôunkyô (Sôunbetsu) (Aug. 3, 1925 & July 26, 1926, N. H.); Mt. Kuro-dake (Aug. 18, 1925, N. H.); Mt. Hakuun-dake (Aug. 5, 1925, N. H.).

106. *Puccinia schizonepetae* Tranzschel in Trav. Mus. Bot. Acad. Imp. Sci. St. Petersb. X, p. 203, 1913. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931).

Hab. III. on *Nepeta subsessilis* Maxim. var. *yezoensis* Franch. et Sav. (*Yezo-misogawasô*). Sôunkyô (Sôunbetsu) (Aug. 3, 1925, N. H.); Mt. Nisekaushuppe (Sept. 7, 1929, M. O.).

107. *Puccinia senecionis* Libert, Pl. Crypt. Ard., Cent. I, no. 92, 1830. (Hiratsuka, f. in Jour. Jap. Bot. XIII, p. 591, 1937).

Hab. 0, I, III. on *Senecio cannabifolius* Less. (*Senecio palmatus* Pall.) (*Hangonsô*). Sôunkyô (Sôunkei) (Aug. 3, 1925, N. H.).

108. *Puccinia tiarellaecola* Hiratsuka, f., Uredinolog. Stud., p. 334, 1955.

Syn. *Puccinia asiatica* (Kom.) Sydow var. *tiarellae* Savile in Canadian Jour. Bot. XXXII, p. 44, 1954. (non *Puccinia tiarellae* Berkeley et Curtis, 1874).

Puccinia asiatica Sydow (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Mem. Tottori Agric. Coll. III, p. 189, 1935).

Hab. III. on *Tiarella polyphylla* D. Don. (*Zudayakushu*). Sôunkyô (Sôunbetsu) (Aug. 17, 1925, N. H.; Sept. 10, 1927, Naoharu Hiratsuka; July 22, 1958, N. & Y. H.); Mt. Kuro-dake (Aug. 18, 1925 & Aug. 12, 1927, N. H.).

109. *Puccinia trautvetteriae* Sydow et Holway in Sydow, Monogr. Ured. I, p. 552 & pl. XXXII, fig. 432, 1903. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 134 & 201, 1935).

Hab. III. on *Trautvetteria japonica* Sieb. et Zucc. (*Trautvetteria palmata* Fisch. et Mey. var. *japonica* Huth.) (*Momijikaramatsu*). Mt. Kuro-dake (Aug. 4 & 18, 1925, July 26, 1926 & Sept. 11, 1926, N. H.; Aug. 12, 1927, S. I., N. H. & S. Iw.); Mt. Hakuun-dake (Aug. 5, 1925, N. H.); Sôunkyô (Sôunkei) (Aug. 17, 1925, N. H.).

110. *Puccinia trollii* Karsten, Myc. Fenn. IV, p. 40, 1879. (S. Ito & Murayama in Transact. Sapporo Nat. Hist. Soc. XIX, p. 27 & fig. 15, 1950).

Hab. III. on *Trollius japonicus* Miq. (*Shinano-kimbai*). Mt. Kuro-dake (Aug. 1, 1932, M. Terui; Sept. 13, 1939, K. Akatsuka).

111. *Puccinia uralensis* Tranzschel in Script. Bot. Hort. Univ. Imp. Petropol. III, p. 138, 1891. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 216, 1931).

Hab. III on *Cacalia hastata* L. var. *pubescens* Ledeb. (*Ô-yobusumasô*). Sôunkyô (Sôunbetsu) (Aug. 4, 1925, N. H.).

112. *Puccinia veronicarum* De Candolle in Fl. Fr. II, p. 594, 1805. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 134 & 201, 1935).

Hab. III. on *Veronica stelleri* Pall. (*Chishima-kuwagata*). Yukinosawa (Sept. 11, 1926, N. H.); Kumonotaira (Aug. 19, 1925, N. H.); Hakuun-sawa (Aug. 14, 1927, S. I., N. H. & S. Iw.); Mt. Goshiki-dake (Aug. 14, 1927, S. I., N. H. & S. Iw.); Daifunkakô (Aug. 13, 1927, S. I., N. H. & S. Iw.).

113. *Puccinia vesiculosa* Schlechtendal ex Ehrenberg, Fung. Chamiss. p. 97, 1820. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931; Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 134 & 202, 1935).

Hab. III. on *Anemone narcissiflora* L. var. *sachalinensis* Miyabe et T. Miyake (*Karafuto-senkaso, Yezo-no-hakusanichige*). Mt. Kuro-dake (July 26, 1926, S. I. & N. H.; Aug. 4, 1925, N. H.); Mt. Hakuun-dake (Aug. 5, 1925, N. H.); Daifunkakô (Aug. 13, 1927, S. I., N. H. & S. Iw.); Yukinosawa (Sept. 11, 1926, N. H.); Mt. Hokkai-dake (Sept. 12, 1926, N. H.).

114. *Puccinia violae* (Schum.) De Candolle, Fl. Fr. VI, p. 62, 1815.

Hab. 0, I, II, III. on *Viola micrantha* Turcz. (*Yezo-no-tachitsubosumire*). Sôunkyô (Sôunbetsu) (Sept. 17, 1926, N. H.).

115. *Puccinia violae-glabellae* Miura ex Sydow in Ann. Myc. XI, p. 101 & text-fig., 1913. (Hiratsuka, f. in Bot. & Zool. II, p. 545, 1934; Mem. Tottori Agric. Coll. III, p. 135 & 203, 1935).

Hab. 0, I, II, III. on *Viola crassa* Mak. (*Takane-sumire*). Mt. Hokkai-dake (Sept. 13, 1927, S. I., N. H. & S. Iw.).

0, I, II, III. on *Viola brevistipulata* W. Beck (*Ôba-kisumire*). Upper part of Rûoman-sorapuchi-kawa (July 5, 1926, M. O.).

116. *Puccinia waldsteiniae* Curtis ex Peck in Ann. Rept. N. Y. State Mus. XXV, p. 120, 1873. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. III, p. 217, 1931).

Hab. III. on *Waldsteinia ternata* Fritisch (*Ko-kimbai*). Sôunkyô (Sôunbetsu) (Aug. 17, 1925, N. H.; Aug. 11, 1927, S. I., N. H. & S. Iw.); Mt. Kuro-dake (Aug. 18, 1925, N. H.).

Uredinales Imperfecti.

117. *Aecidium hydrangeae-paniculatae* Dietel in Bot. Jahrb. XXXII, p. 630, 1903.

Hab. 0, I. on *Hydrangea paniculata* Sieb. var. *floribunda* Rgl. (*Nori-utsugi*). Sôunkyô (July 22, 1958, N. & Y. H.).

118. *Aecidium polygoni-cuspidati* Dietel in Bot. Jahrb. XXXII, p. 629, 1903.

Hab. 0, I. on *Reynoutria sachalinensis* Nakai (*Ô-itadori*). Yukomanbetsu—Sugataminoike (July 21, 1958, N. & Y. H.).

119. *Uredo ishikariense* (Hiratsuka, f.) Hiratsuka, f. in Transact. Myc. Soc. Jap. no. 5, p. 4, 1957. (Hiratsuka, f. in Mem. Facul. Agric. Tokyo Univ. Education. no. 5, p. 120, 1958).

Syn. *Pucciniastrum ishikariense* Hiratsuka, f. in Mem. Tottori Agric. Coll. IV, p. 284, 1936.

Pucciniastrum goodyerae (non Arthur) Hiratsuka, f. in Jour. Facul. Agric. Hokkaido Imp. Univ. XXI, p. 26, 1927. (Hiratsuka, f. in Bot. Mag. Tokyo. XLIV, p. 281, 1930; Jap. Jour. Bot. III, p. 307, 1927).

Hab. II. on *Goodyera maximowicziana* Mak. (*Akebono-shusuran*). Sôunkyô (Sôunbetsu, Sôunkei) (Aug. 4, 1925 & Aug. 18, 1933, N. H.); Mt. Kuro-dake (Aug. 18, 1925, K. M. & N. H.).

120. *Uredo iwatensis* Dietel in Bot. Jahrb. XXXIV, p. 592, 1905.

Hab. II. on *Clinopodium* sp. Sôunkyô (July 22, 1958, N. & Y. H.).

121. *Uredo yamadana* (Hiratsuka, f.) Hiratsuka, f. in Transact. Myc. Soc. Jap. no. 5, p. 3, 1957.

Syn. *Hyalopsora yamadana* Hiratsuka, f. in Hiratsuka, f. & Uemura in Transact. Tottori Soc. Agric. Sci. IV, p. 19 & 24, 1932. (Hiratsuka, f. in Transact. Tottori Soc. Agric. Sci. IV, p. 112, 1932; Mem. Tottori Agric. Coll. IV, p. 177, 1936).

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Der Einfluß tiefer Temperaturen auf das Wachstum und die Lebenstätigkeit höherer Pilze mit spezieller Berücksichtigung von Mykorrhizapilzen.

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Die Beobachtung, dass sich verschiedene Basidiomyceten aus Berglagen (1800 bis 2100 m) in Reinkultur gegenüber der Kulturtemperatur anders verhielten als solche aus Tallagen, legte uns die Notwendigkeit auf, im Rahmen unserer Arbeiten über Mykorrhizapilze aus Hochlagen (Moser 1956, 1958 a, b, c) den Temperatureinfluss genauer zu untersuchen. Um entsprechendes Vergleichsmaterial zu haben, wurden in diese Arbeiten auch zahlreiche Pilze aus Tallagen, ferner auch nicht mykorrhiza-bildende Arten mit einbezogen. Diese verteilen sich einerseits auf verschiedene systematische Gruppen, andererseits stammen sie auch von ökologisch sehr verschiedenen Standorten, bzw. aus Pilzgruppen mit jahreszeitlich verschiedener Fruktifikationsperiode. Der praktische Zweck dieser Untersuchungen lag für uns im wesentlichen darin, Missgriffe bei der von uns in grösserem Umfange geplanten künstlichen Impfung möglichst zu vermeiden.

Es war hierbei von Interesse, einerseits die Grenztemperatur ungefähr festzustellen, bei der die einzelnen Arten überhaupt noch aktives Wachstum aufweisen können, ferner aber auch den Einfluss einer verschieden langen Einfrierungsdauer auf die Lebensaktitvität der Pilzarten zu untersuchen. In ähnlicher Weise wird nunmehr auch der Einfluss hoher Temperaturen geprüft.

In der Literatur finden sich bisher sehr wenig brauchbare Angaben zu diesem Thema. Eine Reihe von Arbeiten befasst sich mit dem Einfluss der Witterung und Temperatur auf die Fruktifikation von höheren Pilzen. So geben die Arbeiten von Wilkins und Mitarbeitern (1940, 1946) und Sprongl (1949) ein ganz gutes Bild über die jahreszeitliche Verteilung im allgemeinen und einzelner Arten im besonderen. Daraus lassen sich immerhin Schätzungen über die minimalen Temperaturen, bei denen noch Fruktifikation stattfinden kann, ableiten. Aus der Arbeit von Wilkins (1946) lässt sich etwa feststellen, dass dies bei 5 Grad C durchschnittlicher Minimumstemperatur der Fall ist. Damit ist aber natürlich noch nichts über die untere Grenze der Wachstumsaktivität des Pilzmycels ausgesagt.

Eine Gruppe weiterer Arbeiten befasst sich mit holzbewohnenden Pilzen (Falck 1909, Lindegren 1933, Liese u. Stramer 1934), einer Gruppe, die an sich durch tiefe Minimumtemperaturen auffällt. Freilich besagt es an sich nicht viel, wenn Arten ein tiefes Einfrieren bis etwa — 175 Grad C überdauern können, wie dies für *Collybia velutipes* und *Schizophyllum commune* angegeben wird. Denn gerade das Tiefgefrieren (u. U. auch nur kurzfristig) kann sich physiologisch ja völlig anders auswirken als geringere Kältegrade, wie sie in der Natur auftreten. Ähnlich verhält es sich mit der Arbeit von Kärcher (1931), bei der Pilze bis auf — 70, — 183— 192 Grad C eingefroren wurden. Dabei überdauerte *Coprinus sterquilinus* — 40°, *Lepiota rhacodes, Boletinus cavipes, Phycomyces nitens* — 60°, *Collybia velutipes, Schizophyllum commune, Hypholoma capnoides, Clitocybe nebularis, Armillariella mellea, Fomes annosus, Xylaria hypoxylon, Saccharomyces cerevisiae, Aspergillus niger, Penicillium „glaucum"* — 70° bei 8-tägiger Dauer, — 183—192° bei 13-stündiger Dauer. Praktische Folgerungen lassen sich jedoch aus derartigen Versuchen keine ziehen.

Über niedere Pilze liegt in dieser Hinsicht etwas mehr Literatur vor. So wird u. a. angegeben, dass etwa *Cladosporium herbarum* noch bei — 6—10 Grad aktives Wachstum zeigen kann (Brooks & Hansford 1923, Bidault 1921). *Phacidium infestans* Karst. ist ebenfalls in der Lage, bei — 5 Grad unter der Schneedecke aktiv zu wachsen (Björkmann 1942, 1948).

Methodik. Die Kulturen wurden in bakteriologischen Eprouvetten gezogen. Die Kultur erfolgte zumeist auf B IV sowie auf einem Nährboden mit Zusatz von Aneurin, Biotin und Inosit (Moser 1958 a, p. 36). Da sich in Stichproben bei Verwendung verschiedener anderer Nährböden kein unterschiedliches Verhalten ergab, wurde von der Heranziehung anderer Nährböden abgesehen. Allenfalls beabsichtigen wir, die Untersuchungen noch durch Kulturen auf bodenartigen Substraten (Torf, Nadelstreu, Rohhumus und in Bodenproben) zu ergänzen. Die Kulturen wurden dann in verschiedenen Kühlschrankfächern die entsprechende Zeit aufbewahrt und allfällige Schwankungen der Temperatur mit Maximum- und Minimumthermometern laufend kontrolliert.

I. Verhalten nach dem Einfrieren der Mycelien.

Hierbei wurden Einfrierungsdauern von 5 Tagen, 14 Tagen, 1 Monat, 2 Monaten und 4 Monaten untersucht. Die längste Einfrierungsdauer wurde auf Grund von Beobachtungen von Aulitzky gewählt, aus denen hervorgeht, dass im Bereich der Gurgler-Versuchsstation der Boden in den oberen Schichten etwa 2—4 Monate Temperaturen von 0 bis — 5 Grad (u. mehr) ausgesetzt ist. Dabei betrugen

die tiefsten Temperaturen in 10 cm Tiefe wohl kaum oder sehr selten weniger als — 11 Grad. Dementsprechend wurde auch eine Einfrierungstemperatur von 10—11Grad minus gewählt. Das Einfrieren erfolgte sofort nach der Beimpfung der Nährböden. In einem späteren Versuch wurden die Kuluren 7—10 Tage bei ca. 18 Grad belassen, und erst nach dem Aushyphen der Impfstücke wurden die Kulturen eingefroren. Darüber soll weiter unten berichtet werden.

Ökologische Gruppen. Es ergab sich sehr bald bei diesen Versuchen, dass gewisse Gruppen von Pilzen, die sich durch ähnliches Verhalten charakterisierten, ± verschiedenen ökologischen Typen entsprechen. Und zwar zeigten vor allem Arten, die im Frühjahr oder Spätherbst fruktifizieren, eine viel ausgeprägtere Resistenz, ferner alle Holzbewohner. Auch Pilze aus Hochlagen ergaben teilweise ein ähnliches Verhalten.

Frühjahrspilze. Etwas aus der Reihe fallen bei dieser Betrachtung, die sonst auf Basidiomyceten beschränkt ist, die beiden Arten *Morchella esculenta* und *Verpa bohemica* var. *bispora* (Sor.). Beide Arten geben sowohl nach kurz- als auch langandauerndem Einfrieren sehr aktive Wachstumsresultate. Nach 4 Monaten Einfrierungsdauer ist allerdings ein Nachlassen der Aktivität zu bemerken, das zumindest zum Teil auf ein Austrocknen von Hyphen zurückzuführen ist.

Leider standen an Frühjahrsbasidiomyceten nur wenige Arten zur Verfügung. *Agrocybe praecox* zeigte nach 2-monatigem Einfrieren noch eine volle Wachstumsleistung, nach 4 Monaten erhielten wir jedoch ein negatives Resultat. Verwendet wurde hierbei ein Hochlagenstamm aus 1850 m. *Clitocybe vermicularis* ergab ein positives Resultat bis zu 1 Monat, *Rhodophyllus hirtipes,* dessen Reinkultur an sich sehr schwach wächst, war nur noch nach 14 Tagen positiv.

Unter die Frühjahrspilze könnten mit gewissem Vorbehalt auch noch *Lepista nuda* und verschiedene *Agaricus*-Arten gerechnet werden, da sie ebenso wie im Spätherbst auch schon ab Mai gefunden werden können.

Bei *Lepista nuda* wurden drei Stämme untersucht, wovon der Stamm 1 c eine Frühjahrsisolierung, 1 b eine Spätherbstisolierung und 1 e eine von Ende September repräsentieren. Der Frühjahrsstamm zeigte positives Wachstum bis nach 1-monatigem Einfrieren, der Spätherbststamm war in allen Fällen positiv, der Septemberstamm stets negativ (kürzere als einmonatige Versuchsdauer wurde hier nicht untersucht). Die *Agaricus*-Arten zeigten nach 1-monatiger Versuchsdauer alle noch aktives Wachstum, wenn auch teilweise etwas geschwächt. Verschiedene Arten sind aber auch nach 2 Monaten noch positiv und *A. bitorquis* und *A. campester* sogar nach 4 Monaten.

Spätherbstpilze. *Clitocybe nebularis* und *Camarophyllus niveus* sind leider die einzigen Arten, die wir als ausgesprochene Spätherbstformen ansprechen können. Davon war *C. nebularis* überraschenderweise ziemlich empfindlich. *C. niveus* hingegen ergab auch nach zweimonatiger Versuchsdauer noch stark positive Resultate.

Hebeloma longicaudum muss wohl ebenfalls in diese Gruppe gerechnet werden. Es verhält sich wie *C. nebularis*, ist also ziemlich empfindlich. Eine Erklärung hierfür bietet sich vielleicht darin, dass die Herbstfröste den Boden nur in den obersten Schichten berühren, sodass die Masse der Mycele unterhalb der gefrorenen Bodenschicht verbleibt. Diese Ansicht wird noch durch die Versuche über die untere Wachstumsgrenze bestärkt, die ergeben, dass diese Arten noch bei ziemliche tiefen Temperaturen aktiv wachsen.

Schliesslich muss noch auf das bereits unter den Frühjahrspilzen für *Lepista nuda* und die *Agaricus*-Arten Gesagte verwiesen werden.

Holzpilze: Fast alle Holzbewohner ergaben ziemlich übereinstimmend hohe Kälteresistenz, ob es sich um *Aphyllophorales, Polyporales* oder *Agaricales* handelte.

Nach 4-monatigem Einfrieren zeigten noch volle Wachstumsaktivität: *Armillariella mellea, Hohenbuehelia atrocoerulea, Kuehneromyces mutabilis, Oudemansiella radicata, Pholiota destruens* (etwas abgeschwächt), *Ph. flavida* und *Ph. aurivella, Pleurotus dryinus, Panus tigrinus, Volvariella bombycina, Sparassis crispa, Fomes annosus, F. marginatus* und *F. officinalis, Lenzites saepiaria* und *abietina, Polyporus frondosus* und *Phellinus robustus.*

Nach zwei Monaten waren *Cortinellus Berkeleyanus, Hygrophoropsis aurantiaca* und *Omphalotus olearius* noch voll aktiv, nach einem Monat *Coniophora cerebella, Favolus europaeus, Polyporellus arcularius,* nach fünf Tagen *Poria Vailantii.* Völlig negativ verhielt sich *Oudemansiella platyphylla,* wobei hier allerdings ein kurzfristiger Versuch nicht durchgeführt wurde.

Hierbei fällt auf, dass z. B. Arten wie *Coniophora cerebella* und *Poria Vaillantii,* die in Gebäuden auftreten, tiefe Temperaturen relativ schlecht vertragen. Liese (1934) fand, dass von 90 Holzpilzarten, die er 14 Tage kaltem Wetter aussetzte, wobei Temperaturen bis zu —26 Grad auftraten, nur *Merulius lacrymans* nicht überlebte. Allerdings handelte es sich bei diesen Versuchen nicht um andauernd tiefe Temperaturen.

Hochlagenpilze. An Hochlagenarten wurden untersucht: *Suillus placidus* S 3 b, *S. plorans* 4 a und b, *S. tridentinus* S. 10 a, *S. variegatus* S 1 b, ferner *Paxillus involutus* P 1 b, der von uns untersuchte Stamm von *Agrocybe praecox, Amanita muscaria, Lactarius porninsis* und *Lactarius rufus* La 3 a sowie *Boletinus cavipes.* Hievon

war nur *Agrocybe praecox* nach 2 Monaten noch voll, *Lactarius rufus* abgeschwächt aktiv, während *S. variegatus* nach einem Monat, *S. plorans* nach 14 Tagen, *Lactarius porninsis* nach 5 Tagen noch Wachstumsfähigkeit zeigten. *Paxillus involutus* ergab zunächst nach zweimonatiger Versuchsdauer ein positives Resultat, während die Versuche mit 14 Tagen und 1 Monat negativ verliefen. Dies dürfte jedoch wohl auf schlechte Impfstücke zurückzuführen sein. Denn eine Wiederholung ergab dann bei diesen Versuchen kräftiges Wachstum. 5-tägiges Einfrieren war auf keine der untersuchten Arten von Einfluss. Alle wuchsen kräftig weiter, mit Ausnahme von *Amanita muscaria.* Der Stamm war zwar aus ca. 2000 m isoliert worden, aber wie die systematische Betrachtung zeigt, ist die ganze Gattung *Amanita* sehr kälteempfindlich.

Besonderes Interesse verdienen hierbei Vergleiche von Hochlagen und Talstämmen ein und derselben Art, wie sie z. B. für *S. variegatus* und *S. tridentinus* vorliegen. Der Hochlagenstamm von *S. variegatus* wurde von *Pinus mugho* in ca. 2100 m Höhe, der Talstamm in 600 m Höhe aus einem *Pinus-silvestris*-Bestand isoliert. Der Unterschied in bezug auf Kälteresistenz ist äusserst krass. Während der Talstamm auch nach 5-tägigem Einfrieren nicht mehr wächst, wurde der Hochlagenstamm erst nach 2-monatigem Einfrieren geschädigt. Bei *S. tridentinus* ist der Unterschied weniger gross. Es stammt aber auch der Hochlagenstamm nur aus etwa 1450 m. Auch bei *S. placidus* wurde der eine Stamm im Gebirge, der andere im Tale gewonnen. Doch zeigen beide ziemlich negatives Verhalten und sind auch sonst nicht direkt vergleichbar, da der Stamm 3 a von *Pinus strobus* isoliert wurde.

Interessant ist auch der Vergleich von *S. plorans, placidus* und *Boletinus cavipes,* wenn man die soziologischen Standortsverhältnisse berücksichtigt. Während der widerstandsfähigere *S. plorans* sein Optimum in bezug auf Fruchtkörperenwicklung auf kahlen oder mit niederer Vegetation bedeckten Standorten hat (Zwergstrauchheiden, Flechtenheiden mit jüngeren *Pinus cembra*-Beständen oder Jungwüchsen), ist *S. placidus* besonders an Stellen mit dichter Bodenbedeckung (dichte Moos- und Flechtenpolster mit *Vaccinum Myrtillus* oder *Rhododendron,* besonders in dichten, geschlossenen jüngeren Zirbenbeständen) zu finden. Es ist also anzunehmen, dass Mycelien von empfindlicheren Arten in dichteren Vegetationsgesellschaften oder in tieferen Bodenschichten überwintern und eventuell auch in etwas tieferen Wurzelhorizonten noch Mykorrhizen bilden. Auch bei *Boletinus cavipes,* der oft in ziemlich dichten Rasenböden auftritt, dürfte es ähnlich sein. Auch hier spricht für diese Ansicht, dass diese Arten zwar längeres Einfrieren nicht überdauern, wohl aber bei tiefen Temperaturen noch aktiv wachsen können.

Bodenpilze aus Tallagen. Hier prägt sich weit stärker eine Abhängigkeit des Verhaltens im Hinblick auf systematische Einheiten aus. Manche Gattungen oder Teile solcher sind stark kälteempfindlich, andere sehr wenig beeinflussbar. Es soll daher weiter unten bei der systematischen Betrachtung näher darauf eingegangen werden.

Einfrieren nach dem Aushyphen.

Bei diesem Versuch wurden die Kulturen so lange bei etwa 18 Grad gehalten, bis sich ein ± starkes Aushyphen der Impfstücke deutlich erkennen liess (etwa 7—10 Tage). Die Kulturen wurden dann auf 1½ Monate bei — 11—12 Grad eingefroren.

Im allgemeinen kann jedoch gesagt werden, dass sich gegenüber dem sofortigen Einfrieren nach der Überimpfung kaum wesentliche Unterschiede ergeben. Die wenigen Fälle, wo wir ein abweichendes Verhalten konstatieren konnten, sind eher durch Verschiedenheiten der Mycelpartien des Inoculums zu erklären (leichte Unterschiede im Alter von Mycelpartien etc.).

Die Kälteempfindlichkeit nach systematischen Gesichtspunkten betrachtet.

Agaricales.

Boletaceae: Sämtliche Boletaceen erwiesen sich als ziemlich empfindlich. Untersucht wurden 8 *Suillus*-Arten, 2 *Boletus-*, 2 *Leccinum-*, 2 *Xerocomus-* und eine *Boletinus*-Art. Lediglich Arten oder Stämme aus Hochlagen, vor allem der Gattung *Suillus,* können hier eine gewisse Ausnahme machen. Von *Suillus Grevillei* sind die Stämme 8b und 8c in ihrem Verhalten verschieden, obwohl beide aus ungefähr der gleichen Höhenlage stammen. Jedoch wurde der Stamm 8b von der Sonnseite, der Stamm 8c von der Schattenseite des Tales isoliert. Es wäre also auch hier an einen kleinklimatischen Einfluss auf das Verhalten gegenüber Kälte denkbar und man könnte die Bildung lokaler physiologischer Kleinrassen für möglich halten.

Gomphidiaceae. Es wurde lediglich *Gomphidius rutilus* zu einigen Experimenten herangezogen und erwies sich hierbei als ziemlich empfindlich, ähnlich wie von den *Paxillaceae Paxillus involutus,* bei dem der Hochlagenstamm auch weniger empfindlich ist. *Camarophyllus niveus* ist an sich sehr unempfindlich. Da es sich aber um die einzige untersuchte Art der Familie handelt, lässt sich bezüglich der *Hygrophoraceae* nichts allgemeineres sagen.

Tricholomataceae: Alle holzbewohnenden Gattungen sind ziemlich resistent. Die Gattung *Clitocybe* verhält sich ziemlich uneinheitlich. Während alle untersuchten Arten bei tiefen Temperaturen noch wachsen, sind sie gegen das Einfrieren teils sehr empfindlich,

teils auch wieder sehr widerstandsfähig. Die untersuchten *Tricholoma*-Arten hingegen sind einheitlich überaus empfindlich. Keine der untersuchten Arten konnte nach dem Einfrieren wieder weiter wachsen, auch nicht bei ganz kurzfristiger Versuchsdauer. Die beiden *Leucopaxillus-Arten* sind ziemlich resistent gegen Kälte. Dabei ist systematisch interessant, dass die eine Art (*L. mirabilis*), die früher ja zu *Tricholoma* gerechnet wurde, sich auch in dieser physiologischen Hinsicht gar nicht wie *Tricholoma* verhält.

Interessant ist das Verhalten von *Clitopilus Passekerianus*. Ihrem Standort in Champignonzuchten entsprechend, würde man eigentlich eine ziemlich grosse Empfindlichkeit erwarten. Doch erwies sich die Art als gegen Kälte völlig resistent.

Amanitaceae. Die Arten der Gattung *Amanita* sind durchwegs sehr anfällig gegenüber tiefen Temperaturen (ebenso wie auch gegen hohe!). Keine einzige ergab positive Resultate, auch nicht ein Hochlagenstamm von *A. muscaria*. Hingegen ist wieder die holzbewohnende *Volvariella bombycina* äusserst resistent und zeigt an sich eine sehr breite Temperaturvalenz, sowohl in bezug auf tiefe als auch hohe Temperaturen. Leider standen uns keine erdbewohnenden *Volvaria*-Arten in Reinkultur zur Verfügung. Auch *Pluteus*-Arten wären zum Vergleich noch sehr interessant gewesen.

Agaricaceae. Alle Arten der Gattung *Agaricus* sind ziemlich einheitlich wenig empfindlich und wachsen nach längerer Einfrierungsdauer meist recht gut. Ganz ähnlich erwiesen sich auch die untersuchten *Macrolepiota*-Arten als sehr resistent.

Cortinariaceae. Leucocortinarius bulbiger ist sehr gegen tiefe Temperaturen resistent (auch wieder ein Umstand, der gegen seine frühere Stellung bei *Tricholoma* spricht). Desgleichen sind die bisher überprüften *Inocybe*-Arten widerstandsfähig, wesentlich weniger die allerdings bisher einzige *Hebeloma*-Art.

Die Gattungen *Myxacium* und *Phlegmacium* hingegen sind, ähnlich wie *Amanita,* äusserst empfindlich und scheinen in ihrer Wachstumsaktivität auf einen sehr engen Bereich, sowohl nach der unteren als auch der oberen Temperaturgrenze, beschränkt zu sein.

Die einzige untersuchte *Strophariaceae, St. aeruginosa,* ist verhältnismässig unempfindlich, wie auch die drei getesteten Pholiotaceen, die als Holzbewohner entsprechend unempfindlich sind. Auch von *Clavariaceae* wurde nur die holzbewohnende *Sparassis cripsa* für die Versuche herangezogen. Auch sie ist entsprechend ihrer ökologischen Gruppe resistent, sodass auf erdbewohnende Arten kein Rückschluss gezogen werden kann.

Bei den *Polyporales* konnten erdbewohnende Arten leider nicht untersucht werden. Es wäre natürlich von Interesse, zu sehen, ob sie sich ebenso resistent verhalten wie die Holzbewohner.

Von Gastromyceten und Ascomyceten liegt so wenig, bzw. auch ökologisch spezialisiertes Material vor, dass keinerlei allgemeine Aussagen möglich sind.

II. Mycelwachstum bei tiefen Temperaturen.

Während die bisher angeführten Versuche dazu dienten, die Widerstandsfähigkeit von Mycelien bei Aussetzung an im Winter im Boden auftretende tiefe Temperaturen zu prüfen, dienten die folgenden Reihen dazu, den ungefähren unteren Temperaturbereich zu erfassen, in dem die Pilze gerade noch aktives Wachstum zeigen können. Dabei wurden zwei Bereiche geprüft und zwar um 0 Grad und + 5 Grad. Da eine ganz exakte Konstanthaltung während der 1—2 Monate dauernden Versuchsreihen nicht möglich war, wurden die Abweichungen laufend mit Minimum- und Maximumthermometern überprüft. Dabei traten bei der 0-Grad-Reihe kurzfristige Abweichungen bis zu — 2 und + 4 Grad auf (etwa beim Öffnen des Kühlschrankes, bzw. durch Stromschwankungen etc.). Bei der zweiten Reihe betrugen die Abweichungen bis zu + 2 und + 8 Grad.

Bei der 5-Grad-Reihe zeigten die Mehrzahl der Arten bereits ein ziemlich starkes Wachstum. Aber gerade bei den Arten oder Artengruppen, bei denen dies nicht der Fall war, zeigt sich eine gewisse systematische Abhängigkeit. So verliefen alle Versuche mit der Gattung *Amanita* völlig negativ, lediglich *A. citrina* zeigte schwache Aushyphungen. Ebenso sind die *Boletus-*, *Leccinum-* und *Xerocomus-*Arten anscheinend stärker wärmebedürftig. Negativ verhielt sich auch *Myxacium delibutum*, während für die Phlegmacien damit gerade die untere Wachstumsgrenze erreicht zu sein scheint. Denn die Mehrzahl der Arten zeigte bereits aktives Wachstum. Und schliesslich ergaben die *Tricholoma*-Arten noch völlig negative Resultate.

Bei den Versuchen um die 0-Grad-Grenze zeichnen sich wieder stärker die ökologischen Gruppierungen ab. Wieder sind die holzbewohnenden Arten am aktivsten, ähnlich wie die Frühjahrspilze. Diese wachsen bei derart niedrigen Temperaturen noch ziemlich stark und scheinen ein gewisses Wachstum auch noch bei einigen Minus-Graden zu besitzen. Dies erklärt auch die frühe Fruktifikation mancher Arten, die ihre Fruchtkörper ja noch unter der Schneedecke entwickeln. Die Wachstumsbegrenzung bei diesen Arten scheint lediglich in der Möglichkeit zu liegen, Flüssigkeit aufzunehmen.

Auch bei Hochlagen-Arten dürfte der Fall ähnlich sein. Diese wachsen teilweise auch noch um die 0-Grad-Grenze, wenn auch etwas schwächer. Es scheint bei Hochlagenpilzen entweder so zu sein, dass sie lange Einfrierungszeiträume überstehen können oder in der Lage sind, bei tiefen Temperaturen (um die 0-Grad-Grenze) noch aktiv zu wachsen. Auf diese Weise können sie entweder in höheren, lange gefrorenen Bodenschichten überwintern, oder sie überwintern in tie-

feren Horizonten und sind in der Lage, frühzeitig im Jahr bzw. rascher aus diesen wieder in obere Schichten emporzuwachsen. Was nun Mykorrhizabildner betrifft, so kann es natürlich sein, dass diese im Zusammenleben mit der Wurzel sich noch etwas anders verhalten. Diese Frage soll eventuell später noch geprüft werden.

Die Fähigkeit, langes Einfrieren zu überdauern, geht sehr häufig mit der Fähigkeit, bei niederen Temperaturen zu wachsen, parallel (etwa die meisten Holzbewohner). Doch muss dies keineswegs der Fall sein. Wir haben Arten beobachtet, die in der Lage sind, lange Einfrierungszeiträume zu überleben, nicht aber bei tiefen Temperaturen zu wachsen (z. B. *Leucocortinarius bulbiger, Lactarius rufus* u. a.). Umgekehrt findet man eben bei extremen ökologischen Gruppen (Hochlagen-Arten, Herbstpilzarten) häufig die Fähigkeit, bei niederen Temperaturen (um die 0-Grad-Grenze) zu wachsen, nicht jedoch lange Einfrierungszeiträume zu überleben.

Folgerungen für künstliche Mykorrhizaimpfungen.

Da wir bei der künstlichen Impfung von Forstpflanzen mit Mykorrhizapilzen vor allem zunächst auf Erzielung widerstandsfähiger Pflanzen für Hochlagenaufforstungen hinarbeiten, ergeben sich für uns aus diesen Beobachtungen einige wichtige Folgerungen. Vor allem tritt ziemlich deutlich hervor, dass auch bei den Mykorrhizapilzen die Provenienzfrage eine bedeutende Rolle spielt. Der Umstand, dass Tallagenstämme (Bsp. *S. variegatus*) viel empfindlicher sind gegenüber niederen Temperaturen, zeigt uns, dass für die künstliche Impfung von Pflanzen für Hochlagen mit Vorteil nur Impfkulturen von Hochlagenstämmen herangezogen werden. Dieser Umstand lässt aber auch die Bedeutung künstlicher Impfungen in einem anderen Lichte erscheinen. Denn selbst wenn Pflanzen ohne künstliche Impfung auch Mykorrhizapilze aus Böden in Talforstgärten annehmen, so werden diese sich bei der Verpflanzung in Hochlagen viel schlechter bewähren, sie werden eventuell nach dem ersten Winter eingehen und es wird einen gewissen Zeitraum benötigen, bis die Pflanze sich mit Hochlagenstämmen assoziiert hat.

Es tritt hier natürlich die Frage der Anpassungsmöglichkeit von Pilzen an andere Temperaturverhältnisse an uns heran. Die Zeiträume, über die sich unsere Beobachtungen erstrecken, sind noch etwas kurz, um hierüber etwas sicheres aussagen zu können. Die am längsten beobachteten Stämme haben wir nunmehr seit 5—6 Jahren in Kultur. Aus allen Beobachtungen aber können wir heute sagen, dass Tallagen-Stämme bisher ihr Verhalten gegenüber tiefen Temperaturen nicht verändert haben. Hochlagenstämme, die sich zunächst auch nur bei etwas niedrigeren Temperaturen gut isolieren lassen (Maximum bei etwa 20 Grad!), können sich allmählich an die Kultur

bei etwas höheren Temperaturen anpassen. Sie wachsen aber immer bei höheren Temperaturen schlechter. Wesentlich aber ist, dass sie ihre Fähigkeit, bei niederen Temperaturen zu wachsen, bisher nicht verloren haben. Weitere Versuche in dieser Richtung sind natürlich noch erforderlich, vor allem deren Ausdehnung über noch längere Zeiträume.

Summary.

Experiments were carried out on the ability of higher fungi to survive longer periods (up to 4 months) of freezing (about — 11—12° C, corresponding to temperature conditions occuring in mountain soils during winter), and to grow at low temperatures (about 0° and + 5° C). From these experiments we conclude, that fungi from special ecological habitats (e. g. spring- and autumn-fungi, mountain-fungi, wood-inhabiting fungi etc.) have generally the ability to withstand long periods of freezing or to grow at low temperatures or both. — On the other hand we find that with regard to low temperatures there exists a fairly pronounced strainspecificity. That will say, that e. g. a species isolated from the mountain-region is able to grow at low temperatures whereas as strain of the same species isolated from the valley can not. Somewhat less pronounced we can find such conditions with strains isolated from the sunny and the shadowy side of a valley. This means, that we should use for artificial inoculation of forest trees in nurseries with mycorrhizal fungi, destined for reforestation in mountainous regions, only fungal strains isolated from mountain-regions.

Tabelle I. Zusammenfassung der ausgeführten Experimente.

Die Pilzarten in alphabetischer Reihenfolge. 5 = Wachstum, den optimalsten Verhältnissen entsprechend, 4 = sehr gut, 3 = gut, 2 = schwach, 1 = sehr schwach (nur Hyphenflaum), 0 = kein Wachstum, — = kein Versuch durchgeführt. Die mit (G) bezeichneten Arten stammen aus der Kulturensammlung des Institutes für Gartenbau, Abt. Angew. Pilzkunde, Markleeberg, DDR, die mit (L) bezeichneten von Prof. Dr. K. Lohwag, die übrigen wurden in unserem Institut isoliert.

Pilzart	Einfrierungsdauer					Kultur bei	
	5 Tg.	14 Tg.	1 M.	2 M.	3 M.	—2—+4	+2-8
Agrocybe praecox	5	5	5	5	0	3	5
(G) A. dura	—	5	5	5	0	3	4
(G) Agaricus arvensis	—	3	2	3	0	2	3
(G) A. bisporus	—	3	4	0	0	2	3
(G) A. bitorquis	—	5	4	5	5	1	3
(G) A. campester	—	5	4	3	3	1	3
(G) A. haemorrhoidarius	—	5	3	5	0	2	3
(G) A. porphyreus	—	3	2	0	0	0	2

Pilzart	Einfrierungsdauer					Kultur bei	
	5 Tg.	14 Tg.	1 M.	2 M.	3 M.	−2	−4 +2-8
(G) A. silvaticus	—	2	2	0	0	3	4
(G) A. silvicola	—	2	4	5	0	0	3
(G) A. vaporarius	—	2	2	0	0	1	2
(G) A. xanthoderma	—	2	3	3	0	2	3
Amanita muscaria	0	0	0	0	0	0	1
(G) A. citrina	—	0	0	0	0	0	1
(G) A. rubescens	—	0	0	0	0	0	0
(G) A. spissa	—	0	0	0	0	0	0
(G) A. virosa	—	1	1	0	0	0	0
Armillariella mellea	5	5	5	5	5	0	3
Anthurus muellerianus var. aseroëformis	2	0	0	0	0	0	2
Boletinus cavipes 1 b	0	0	0	0	0	2	5
Boletinus cavipes 1 c	—	0	0	0	0	2	5
Boletus edulis	0	0	0	0	0	0	0
(G) B. erythropus	—	0	0	0	0	0	0
(G) Bovista nigrescens	—	5	5	0	5	0	2
(G) Bovista plumbea	—	5	5	3	3	0	2
Clitocybe nebularis	5	3	0	0	0	2	3
(G) C. ditopa	—	5	5	0	0	3	4
(G) C. gilva	—	0	0	0	0	2	5
(G) C. inversa	—	0	0	0	0	2	3
(G) C. odora	—	5	5	0	0	3	5
(G) C. suaveolens	—	5	5	5	5	2	5
C. vermicularis	5	5	5	0	0	2	3
(G) Camarophyllus niveus	—	5	5	5	0	1	2
(L) Coniophora cerebella	5	5	5	0	0	0	4
(L) Cortinellus Berkeleyanus	5	5	5	5	0	2	5
(L) Clitopilus Passeckerianus	5	4	5	5	5	3	5
Fomes officinalis	5	5	5	5	5	1	3
(G) F. annosus	—	5	5	5	5	0	3
F. marginatus	5	5	5	5	5	1	5
Favolus europaeus	5	4	5	5	?	5	5
(G) Gomphidius rutilus	—	—	—	—	—	0	2
Hebeloma longicaudum	2	4	0	0	0	3	5
(G) Hohenbuehelia atrocoerulea	—	5	5	5	5	5	5
(G) Hygrophoropsis aurantiaca	—	5	5	3	0	0	3
(G) Inocybe lacera	—	5	5	5	5	2	5
I. fibrosa	5	—	—	—	—	2	5
(L) Kuehneromyces mutabilis	5	5	5	5	5	2	5
(G) Lactarius deliciosus	—	—	—	—	—	0	1
L. porninsis	3	1	0	0	0	0	0
L. rufus 3 a	—	—	—	3	0	0	2
L. rufus 3 b	—	2	2	0	0	0	2
L. torminosus	3	2	3	3	0	0	0

Pilzart	Einfrierungsdauer					Kultur bei	
	5 Tg.	14 Tg.	1 M.	2 M.	3 M.	—2—+4	+2-8
Leccinum scabrum 1 a	0	0	0	0	0	0	1
L. scabrum 1 b	0	0	0	0	0	0	1
L. aurantiacum 2 a	0	0	0	0	0	0	2
(L) Lenzites saepiaria	5	5	5	5	5	2	3
(L) L. abietina	4	5	3	5	2	0	3
Lepista nuda 1 b	5	4	3	5	3	2	4
L. nuda 1 c	5	5	5	0	0	2	4
L. nuda 1 e	—	—	0	0	0	3	5
Leucocortinarius bulbiger	—	5	5	5	5	0	2
Leucopaxillus mirabilis	—	3	2	3	0	0	2
L. giganteus	2	3	3	4	0	2	3
(G) Macrolepiota gracilenta	—	5	5	5	0	2	3
M. procera	5	5	5	5	5	3	3
Morchella esculenta	5	5	5	?	2	3	5
Myxacium delibutum	0	0	0	0	0	0	0
(L) Omphalotus olearius	5	5	5	5	0	2	5
(G) Oudemansiella radicata	5	5	5	5	5	3	5
(G) Ou. platyphylla	—	0	0	0	0	0	1
Paxillus involutus 1 a	0	0	0	0	0	0	2
P. involutus 1 b	5	3	2	2	0	2	5
Phaeolepiota aurea	—	—	—	—	—	2	2
Phlegmacium allutum 3 a	0	0	0	0	0	0	2
Phl. allutum 3 b	2	—	—	—	—	0	0
Phl. aureopulverulentum	—	0	0	0	0	0	3
Phl. brunneocoeruliescens	—	—	—	—	—	0	2
Phl. caesiocanescens	0	0	0	0	0	0	3
Phl. calochorum	—	0	0	0	0	0	3
Phl. cephalixum	0	0	0	0	0	2	3
Phl. cliduchum ss. Ricken	0	0	0	0	0	2	3
Phl. coerulescens var. cyaneum	—	—	—	—	—	0	2
Phl. corrosum	—	—	0	0	0	2	4
Ph. elegantior 8 b	0	0	0	0	0	0	3
Phl. elegantior 8 c	0	0	0	0	0	0	2
Phl. fuscomaculatum	—	0	0	0	0	0	2
Phl. glaucopus	0	0	0	0	0	0	0?
Phl. infractum	0	0	0	0	0	0	1
Phl. orechalcium ss. Mos.	0	0	0	0	0	0	3
Phl. purpurascens	0	0	0	0	0	0	2
Phl. sulphureum ss. Lge.	—	—	—	—	—	2	3

Pilzart	Einfrierungsdauer 5 Tg.	14 Tg.	1 M.	2 M.	3 M.	Kultur bei −2—+4	+2-8
Phl. variegatum	0	0	0	0	0	0	3
Phl. varium	0	0	0	0	0	0	3
(L) Phellinus robustus	5	5	5	5	5	1	3
(L) Panus tigrinus	5	5	5	5	5	0	4
Pholiota destruens	5	5	5	3	3	2	3
(G) Ph. aurivella	5	5	5	5	5	3	5
Ph. flavida	5	5	5	5	5	3	5
(L) Pleurotus dryinus	5	5	5	5	5	0	0
(G) Polyporus frondosus	5	5	5	5	5	0	5
(L) Polyporellus arcularius	5	5	5	0	0	2	4
(L) Poria Vaillantii	5	0	0	0	0	2	3
Rhodophyllus hirtipes	2	2	0	0	0	3	3
(G) Sparassis crispa	—	5	5	3	4	1	3
(G) Stropharia aeruginosa	—	5	5	0	0	2	3
Suillus aeruginascens	3	0	0	0	0	0	3
S. Bresadolae	0	0	0	0	0	0	3
S. granulatus	—	—	—	—	—	2	5
S. Grevillei 8 b	5	0	0	0	0	0	2
S. Grevillei 8 c	3	3	3	0	0	0	2
S. piperatus	0	0	0	0	0	0	2
S. placidus 3 a	5	0	0	0	0	2	4
S. placidus 3 b	3	0	0	0	0	0	3
S. plorans 4 a	5	2	0	0	0	1	3
S. plorans 4 b	3	3	0	0	0	1	5
S. tridentinus 10 a	3	2	0	0	0	0	1
(G) S. tridentinus 10 b	3	0	0	0	0	0	2
S. variegatus 1 a	0	0	0	0	0	0	0
S. variegatus 1 b	5	5	5	0	0	2	3
(L) Trametes cinnabarina	5	5	5	5	5	2	3
Tricholoma robustum	0	0	0	0	0	0	0
Tr. saponaceum	0	0	0	0	0	0	0
Tr. vaccinum	0	0	0	0	0	0	0
Verpa bohemica var. bispora	5	5	5	5	2	3	5
(G) Volvariella bombycina	—	5	5	5	5	0	2
(G) Xerocomus badius	0	0	0	0	0	0	3
X. subtomentosus	0	0	0	0	0	0	3
Xanthochrous rheades	—	—	—	—	—	2	3

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Ueber die Ascomycetengattung Marchalia Sacc.

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Als *Rhytisma spurcarium* und *Rhytisma constellatum* beschrieben Berkeley und Broome (1875) zwei auf Blättern von *Artocarpus integrifolia* zusammen untermischt vorkommende Pilze. Bei der einen Art sollten sich die Loculi mit runden Mündungen, bei der andern mit einem Spalt öffnen, ferner sollten sich die beiden Pilze in der Form und Grösse der Asci und Sporen unterscheiden. Ohne sie zu untersuchen, begründete Saccardo (1889) auf ihnen eine neue Gattung, die er *Marchalia* nannte. An erster Stelle führte er *M. constellata* an, die daher als Typusart zu gelten hat. Von Höhnel (1909) und Theissen und Sydow (1915) betrachteten die beiden Arten auf Grund einer Untersuchung der Originalexemplare als identisch. Der als *Rhytisma spurcarium* beschriebene Pilz sollte nichts anderes als der völlig ausgereifte Zustand von *Rh. constellatum* sein. Während von Höhnel die Art zu *Hysterostomella* stellte, anerkannten Theissen und Sydow die Gattung *Marchalia* mit der Typusart *M. constellata* und stellten sie zu den Polystomellaceen.

Die Untersuchung des Originalexemplares aus dem Herbarium der Royal Botanic Gardens in Kew zeigte nun folgenden Sachverhalt: Der als *Rhytisma spurcaria* beschriebene Pilz ist eine typische Art der Parmulariaceen-Gattung *Cocconia* Sacc. und steht der Typusart dieser Gattung sehr nahe. Die als *Rhytisma constellatum* beschriebenen Stromata sind von einem Hyperparasiten befallen. Bei diesem handelt es sich um einen einfachen Pyrenomyceten, der seine Fruchtkörper in regelmässigen Abständen im kreisringförmigen Loculus des Wirtspilzes angelegt hat. Die Deckschicht wird vom Hyperparasiten über den scheitelständigen Mündungen der Fruchtkörper in Form von rundlichen Löchern aufgesprengt. Die Fruchtkörper sind kugelig oder etwas niedergedrückt, 125—180 µ gross und besitzen eine hellbraune oder fast hyaline, 7—12 µ dicke, aus mehreren Lagen von kleinen, etwas flach gedrückten Zellen aufgebaute Wand. Die parallel stehenden und von fädigen Paraphysoiden umgebenen Asci sind bitunicat, zylinderisch und messen 60—80 ⇌ 13—17 µ. Sie enthalten acht länglich eiförmige oder fast keulige, beidends verjüngte, ungefähr in der Mitte septierte, 18—24 ⇌ 7—8,5 µ grosse Ascosporen. Diese sind braun und besitzen ein etwa 1 µ dickes, fein punktiert rauhes Epispor.

Die Diagnose von *Rhytisma constellatum* als Typusart der Gattung *Marchalia* beruht demnach auf einem Mixtum von zwei Pilzen und *Marchalia* Sacc. muss daher als Ascomycetengattung gestrichen werden. Der Hyperparasit ist eine typische Art der Gattung *Didymosphaeria* Fuck. Für die auf andern Pilzen parasitierenden Formen besteht eine eigene Gattung *Cryptodidymosphaeria* (Rehm) v. Höhn. (Sydow, 1939). Nach einer Mitteilung von Dr. H. Scheinpflug (jetzt in Giessen) lässt sich diese jedoch nicht aufrecht erhalten, da sich die Fruchtkörper ein und derselben Art ausser auf anderen Pyrenomyceten auch auf Pflanzenresten entwickeln können. Der oben beschriebene Hyperparasit stimmt aber mit keiner bekannten Art überein und muss als neu beschrieben werden.

Didymosphaeria cocconiae v. Arx spec. nov.

Perithecia in stromatibus Cocconiae parasitantia, loculi fungi innata, globosa vel leniter depressa, 125—160 μ diam., collo plano papilliformi poro 15—25 μ diam. pertuso praedita; pariete molliter membranaceo, ca. 7—12 μ crasso, e pluribus stratis cellularum dilute flavo-brunnearum vel mellearum composito; asci sat numerosi, cylindracei, antice late rotundati, deorsum sensim attenuati, crassiuscule bitunicati, 8-spori, 55—75 ⇌ 13—19 μ; ascosporae plus minus distichae, oblongo-fusoideae, circa medium septatae, vix constrictae, asperulatae, dilute brunneae, 18—24 ⇌ 7—8,5 μ; paraphysoides filiformes.

Hab. in stromatibus *Cocconiae spurcariae* (Berk. et Br.) v. Arx ad folia viva *Artocarpi integrifoliae* (Ceylon) et *A. incisae* (Philippina).

Der Wirtspilz lässt sich folgendermassen charakterisieren:

Cocconia spurcaria (Berk. et Br.) v. Arx comb. nov.

Syn.: *Rhytisma spurcarium* Berk. et Br. — J. Linn. Soc. (Bot.) 14: 131 (1875).
Marchalia spurcaria (Berk. et Br.) Sacc. — Syll. fung. 8: 737 (1889).
Hysterostomella spurcaria (Berk. et Br.) v. Höhn. — Sitzber. K. Ak. Wiss. Wien, math.-nat. Kl., 1. Abt., 118: 1516 (1909).
Matr.: *Artocarpus integrifolia* (Ceylon) und *A. incisa* (Philippinen).

Die sich epiphyll dicht zerstreut entwickelnden Stromata sind mattschwarz, im Umrisse rundlich, 0,7—1,5 mm gross und flach krustenförmig. Sie entwickeln sich aus einem vor allem intracpidermal wuchernden, mit Nährhyphen auch tiefer ins Substrat eindringenden Hypostroma. Dieses ist etwa 20 μ dick, zellig-hyphig; im untern Teil hell, wird es in der obern Hälfte der Epidermiszellen dunkelbraun und besteht dann aus derben, unregelmässig eckigen oder gestreckten, 4—8 μ grossen Zellen. Von diesen aus durchwachsen zahlreiche, 1,5—2 μ dicke, kurze Hyphenglieder einzeln die Aus-

senwand der Epidermiszellen und die Kutikula und schreiten zur Bildung der oberflächlichen Stromakruste. Diese besteht bei der Reife aus einem sterilen, flachen Zentrum und erreicht bei dem einen (gelegentlich unterbrochenen oder unvollständigen) Kreisring bildenden Loculus eine Höhe von 100—130 μ. Die derbe, undurchsichtige, schwarze Deckschicht ist 16—30 μ dick, läuft gegen den Rand in ein Häutchen aus und besteht aus radiär angeordneten, 3,5—5 μ breiten, bis 15 μ langen, braunwandigen Zellen. Die Basalschicht ist dünn häutchenförmig. Der linienförmige, gewöhnlich zu einem Kreisring geschlossene Loculus ist 150—220 μ breit und öffnet sich über der 60—80 μ hohen Fruchtschicht mit einem unscharf berandeten Spalt. Die Asci sind keulig, liegen oft etwas schräg, messen 50—70 ⇌ 25—40 μ, besitzen eine doppelte, vor allem nach oben stark verdickte Membran, sind einer Schleimmasse eingebettet und von fädigen Paraphysoiden umgeben. Diese bilden über den Asci ein unvollständiges, schollig-schleimiges, bräunliches Epithecium. Die beidends breit abgerundeten Ascosporen sind ungefähr in der Mitte septiert, färben sich reif braun und messen 24—30 ⇌ 11—15 μ.

Neben dem Originalexemplar wurden noch zwei andere, von C. F. Baker auf den Philippinen und von Petch auf Ceylon gesammelte Kollektionen aus dem Naturhistoriska Riksmuseum, Botaniska avdelningen in Stockholm untersucht. In diesen war der Pilz aber durch *Didymosphaeria cocconiae* und andere Hyperparasiten völlig verdorben. Die von Batista und Vital (1957) nach diesen Kollektionen entworfene Beschreibung und die Abbildungen beziehen sich denn auch grösstenteils auf *Didymosphaeria cocconiae.*

Den gleichen Fall wie bei *Marchalia* haben wir bei der Typusart der Gattung *Phaeodothis* Syd. Wie bereits Sydow (1939) vermutete, beruht diese auf einer *Phyllachora,* in der eine *Didymosphaeria* parasitiert. Die Untersuchung des Originalexemplares zeigte, dass es sich hierbei um *Phyllachora tricuspidis* Speg. und um *Didymosphaeria Winteri* Niessl Syn. *Cryptodidymosphaeria clandestina* Syd. (vgl. Scheinpflug 1958) handelt. Bei dem in Stockholm aufbewahrten Material der Originalkollektion ist der Hyperparasit reichlich vorhanden und gut entwickelt. Die Gattung *Phaeodothis* muss daher als Nomen confusum ebenfalls gestrichen werden.

Summary.

Marchalia constellata (Berk. et Br.) Sacc., the type species of the genus *Marchalia* Sacc. is based on a Parmulariaceae, which is attacked by a hyperparasite. The genus name *Marchalia* is therefore based on two different fungi and is a nomen confusum. The host fungus, described as *Rhylisma spurcarium* Berk. et Br. = *Marchalia spurcaria* (Berk. et Br.) Sacc. is closely related to the type species of the genus *Cocconia* Sacc. and must be named *Cocconia spurcaria*

(Berk. et Br.) v. Arx comb. nov. A full description of this fungus is given. The hyperparasite is described under the name *Didymosphaeria cocconiae* v. Arx spec. nov. The type species of *Phaeodothis* Syd. is *Phyllachora tricuspidis* Speg., parasitized by *Didymosphaeria Winteri* Niessl.

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Über einige bemerkenswerte Discomyceten aus den Alpen.

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Mit 9 Abbildungen.

Während der im Sommer 1958 unter der Leitung von Prof. Dr. E. Gäumann durchgeführten Exkursion unseres Institutes in die französischen Westalpen (Departement Hautes-Alpes), haben wir einige Discomyceten gesammelt, welche sich nach eingehenden Untersuchungen als bemerkenswerte Funde herausgestellt haben. Schon früher haben wir in den Alpen andere nicht allägliche Discomyceten gesammelt und erst vor kurzem hat unser Herr Privatdozent Dr. H. Hess, dem wir auch an dieser Stelle herzlich für seine Aufmerksamkeit danken möchten, Material von *Arctostaphylos uva ursi* (L.) Sprengel mit nicht weniger als vier verschiedenen Arten von einer Alpenexkursion mitgebracht. All diese Pilze seien nachfolgend besprochen und, soweit es uns notwendig scheint, auch durch Abbildungen belegt.

1. *Chaetonaevia Nannfeldtii* v. Arx.

Chaetonaevia Nannfeldtii wurde von v. Arx (1951) als Typus einer neuen Gattung beschrieben und abgebildet. Er hatte den Pilz anlässlich einer im Rahmen des 7. Internationalen Botanischen Kongresses in Stockholm durchgeführten Exkursion nach Jämtland (Schweden) auf *Arctostaphylos alpina* (L.) Sprengel gesammelt. Der Pilz scheint aber in Skandinavien weiter verbreitet zu sein; denn wir haben ihn auch auf Material gesehen, das Herr Dr. R. W. G. Dennis (Kew) aus Norwegen mitgebracht hat.

Wie die unten angeführten Fundortangaben zeigen, kommt der charakteristisch gebaute Pilz auch in den Alpen auf *Arctostaphylos alpina* vor; er scheint aber tatsächlich selten zu sein. Trotzdem wir nämlich eine grössere Zahl Belege von *Arctostaphylos alpina* durchgesehen haben, ist es bei den unten aufgeführten Funden geblieben. Es ist deshalb anzunehmen, es handle sich um einen recht seltenen Pilz, welcher zudem wegen seines versteckten Wachstums nur sehr schwer aufzufinden ist. Immerhin liegt die Vermutung nahe, er könne im ganzen, sich von Kalifornien über die Arktis bis in die Pyrenäen erstreckenden Verbreitungsgebiet des Wirtes aufgefunden werden.

Der Pilz besitzt vom Auge kaum wahrnehmbare, gelbliche oder blassbraune, 145—200 μ grosse Apothecien mit starren, senkrecht abstehenden, hyalinen, leicht abfallenden Borsten. Die Asci sind breit keulenförmig; sie messen 50—65 ⇌ 15—22 μ und enthalten je vier Ascosporen, welche gebündelt nebeneinander liegen. Sie sind spindelförmig, leicht gekrümmt, jung hyalin und einzellig, später dunkelbraun und zweizellig, 43—54 ⇌ 7—10 μ gross und mit einem deutlichen Epispor versehen. (Abb. 4, t).

Fundorte: Kt. Graubünden, Albulapass, Crap alv ca. 2300 m. s. m. 16. 7. 1953. — Sayserköpfe ob Fürstenalp ca. 2100 m. s. m. 15. 9. 1902 leg. A. Volkart.

2. **Laetinaevia setosa** nov. spec.

Auf ziemlich stark vermorschten, vorjährigen Blättern von *Lonicera nigra* L. haben wir in den Westalpen einen kleinen, hellgefärbten und deshalb — ähnlich wie *Chaetonaevia Nannfeldtii* v. Arx — sehr unscheinbaren Discomyceten gefunden, welcher sich folgendermassen beschreiben lässt:

Die in den obersten Schichten des verschrumpften, abgestorbenen Wirtsgewebes eingesenkten, später hervorbrechenden, im Umriss rundlichen und 70—130 μ grossen und 50—70 μ hohen Apothecien sind ringsum von Epidermislappen eingefasst. Das 10—15 μ dicke Excipulum besteht basal aus isodiametrischen, 4—7 μ grossen, hyalinen, ziemlich derbwandigen Zellen, welche ohne scharfe Grenze in das aus zartwandigen, ebenfalls isodiametrischen, etwas kleineren Zellen aufgebaute Hypothecium übergehen. Seitlich setzt sich das Excipulum aus undeutlich prismatischen oder ebenfalls isodiametrischen Zellen zusammen. Im inneren Teil sind diese regellos, im äusseren Teil dagegen in deutliche radiale Schichten geordnet (im Schnitt als Reihen erkennbar). Die Fruchtkörperwand ist aussen im obern Drittel des Fruchtkörpers mit 10—40 μ langen und an der Basis 4 μ dicken, am Ende sich stark verjüngenden und zugespitzten, oft teilweise auch im untern Teil etwas gebogenen Borsten besetzt, welche eine ziemlich enge, spiralige Drehung im Uhrzeigersinn aufweisen (im Mikroskop umgekehrt, d. h. im Gegenuhrzeigersinn gedreht, ebenfalls auf der beigegebenen Abbildung 1).

Die Asci sind 40—50 ⇌ 8—9 μ gross, keulig, zartwandig und inoperculat. Zwischen ihnen stehen fädige, oben mehr oder weniger keulig angeschwollene, hyaline Paraphysen, die sie deutlich überragen. Sie enthalten je acht einzellige, undeutlich zwei- bis dreireihig angeordnete, länglich ellipsoidische bis länglich eiförmige, 12—14 ⇌ 2,5—3,5 μ grosse, hyaline, schwach gekrümmte Ascosporen [vgl. auch Abb. 4, a) und b)].

Es unterliegt keinem Zweifel, dass dieser Pilz am besten in die von Nannfeldt (1932) aufgestellte Unterfamilie der *Naevioideae*

gehört. Für Formen mit einzelligen Sporen hat Nannfeldt dort zwei Gattungen unterschieden: *Naevia* Fr. und *Laetinaevia* Nannf., welche sich vor allem durch die Textur des seitlichen Excipulums unterscheiden und sicher gute Taxa sind. Unser vorliegender Pilz gehört, abgesehen von den eigenartigen Borsten, ohne weiteres in die Gattung *Laetinaevia* Nannf., mit deren Vertretern er nicht nur die Wandtextur, sondern auch die relativ grossen, sich oben deutlich verjüngenden Asci, sowie die oben etwas angeschwollenen Paraphysen gemeinsam hat. Nicht zu den andern Arten der Gattung passen — wie schon oben erwähnt — die Borsten, welche sicher für den vorliegenden Pilz typisch sind, im übrigen aber kaum als so wesent-

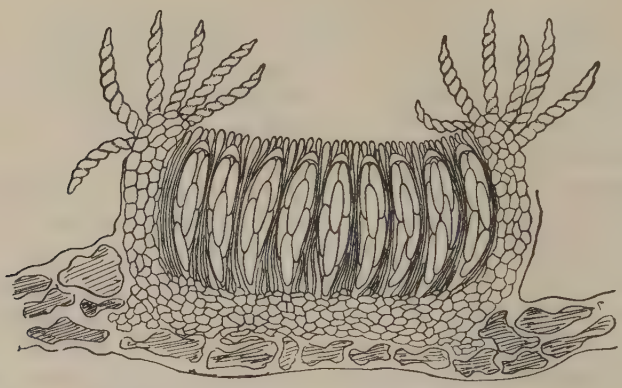

Abbildung 1. *Laetinaevia setosa.* Schnitt durch ein Apothecium. Vergr. 250 ×.

liches Merkmal betrachtet werden dürfen, dass sich eine generische Trennung aufdrängte. Der Pilz sei daher zu *Laetinaevia* Nannf. gestellt und, da wir keine entsprechende, beschriebene Form gefunden haben, als neue Art beschrieben:

Laetinaevia setosa nov. spec.

Apothecia immersa, erumpentia, rotunda, 70—130 μ diam. et 50—70 μ altitudine. Cellulae excipuli hyalines, 4—7 μ diam., crasse tunicatae, superiore in hypothecium, confluentes et tenuiter tunicatae. 10—15 μ crassitudine excipulum parte superiore saetis ornatum. Saetae 10—40 μ longitudine, base 4 μ crassitudine, supra fastigatae et curvatae, plerumque in cochleam retortae. Claviformes asci 40—50 ⇌ 8—9 μ tenuiter tunicati, 8-spori. Hyalines paraphyses filiformes, apice claviformes, longiores ascis. Sporae longe ellipsoideae vel oviformes, 12—14 ⇌ 2,5—3,5 μ, hyalines, paulum curvatae.

In hibernatis foliis cariosis *Lonicerae nigrae* L. habitat. — Gallia, Dept. Hautes Alpes, Val Queyras, Echalpe, 28. 6. 1958.

3. *Drepanopeziza*-Formen auf *Ribes*.

Der Konidienpilz *Gloeosporidiella ribis* (Lib.) Petr. [Synonym: *Gloeosporium ribis* (Lib.) Mont. et Desm.] verursacht zuweilen auf kultivierten *Ribes*-Arten starke Blattfall-Epidemien. Klebahn (1906, 1918) hat als erster die dazu gehörige Hauptfruchtform, welche im Frühjahr auf den überwinterten Blättern erscheint, gefunden und sie zunächst in eine eigene Sektion (*Drepanopeziza*) zur Gattung *Pseudopeziza* Fuck. gestellt. Von Höhnel (1917) erhob dann diese Sektion zur Gattung, was unter anderem auch von Nannfeldt (1931, 1932) anerkannt wurde, wobei er (1932) sie mit *Diplocarpon* Wolf und *Higginsia* Nannf. zur Unterfamilie der Drepanopezizoideae zusammenfasste.

Wir haben im Val Queyras (Frankreich, Hautes-Alpes) schon früher und nun wiederum im Sommer 1958 auf überwinterten Blättern der dort spontan vorkommenden *Ribes petraeum* Wulfen, *Ribes alpinum* L. und *Ribes grossulariae* L. Formen von *Drepanopeziza* gefunden, welche in der Form ihrer Apothecien etwas voneinander abwichen. Diese Funde sind deshalb erwähnenswert, weil auf den oben genannten Wirten bisher noch keine *Drepanopeziza*-Hauptfruchtformen gefunden worden sind.

Nach den Versuchen von Klebahn (1906, 1918) zerfällt der Erreger dieser *Ribes*-Krankheit in mehrere formae speciales und zwar in die

1. f. sp. *rubri* Kleb. mit *Ribes rubrum* L. und *Ribes aureum* L. als experimentell nachgewiesene Wirtspflanzen, während *Ribes alpinum* L., *Ribes grossularia* L., *Ribes nigrum* L. und *Ribes sanguineum* L. nicht befallen werden;

2. f. sp. *nigri* Kleb. mit *Ribes nigrum* L., *Ribes aureum* L., *Ribes rubrum* L., und *Ribes sanguineum* L., als experimentell geprüften Wirtspflanzen, während *Ribes alpinum* L., und *Ribes cynosbati* L. nicht, *Ribes grossularia* L. nur sehr fraglich befallen werden;

3. f. sp. *grossulariae* Kleb. mit *Ribes grossularia* L. und *Ribes rubrum* L. als experimentell geprüften Wirtspflanzen, während *Ribes alpinum* L., *Ribes aureum* L., *Ribes nigrum* L. und *Ribes sanguineum* L. nicht befallen werden.

In allen drei Fällen wird die an erster Stelle genannte Wirtspflanze am eindeutigsten befallen, stellt also den Hauptwirt dar, während die übrigen viel schwächer infiziert wurden und deshalb nur als Nebenwirte angegeben werden können.

Für Klebahn (1918) ergab sich nomenklatorisch insofern eine Schwierigkeit, als er für die ersten zwei „formae speciales" den Namen der Hauptfruchtform — bei ihm noch *Pseudopeziza ribis* — voranstellen konnte, während er für die dritte biologische Form — f. sp. *grossulariae* — noch keine Hauptfruchtform gefunden hatte und demnach nur den Namen der Konidienform verwenden konnte.

Mit diesen drei Formen ist aber die Aufteilung der Ribes bewohnenden *Drepanopeziza* —, bzw. *Gloesporidiella*arten noch nicht erschöpfend dargestellt. Janczewski und Namyslowski (1910) haben als weitere biologische Form die f. sp. *parillae* aufgestellt, welche auf *Ribes integrifolium* Phil., *Ribes polyanthes* Phil., *Ribes magellanicum* Poiret, *Ribes fasciculatum* Siebold et Zucc. und den Bastarden *Ribes integrifolium* × *polyanthes* und *Ribes integrifolium* × *valdivianum* Phil., also auf Arten der Ribes-Untergattung *Parilla,* aufgefunden wurde; es fehlen allerdings in diesem Falle Infektionsversuche.

Auf *Ribes alpinum* L. hat Laubert (1904) eine morphologisch durch weniger breite Konidien sich deutlich von den auf andern *Ribes*-Arten vorkommenden *Gloeosporidiella*-Formen unterscheidende Art, welche er *Gloeosporium variabile* Laub. nannte, gefunden. Diese Art ist heute unter *Gloeosporidiella variabilis* (Laub.) Nannf. eingereiht. Wie aus den Klebahn'schen Infektionsversuchen hervorgeht, kann *Ribes alpinum* L. durch keine von ihm geprüfte biologische Form der *Drepanopeziza ribis* befallen werden, es handelt sich daraus folgend bei der *Ribes alpinum* L. besiedelnden Form auch biologisch um etwas selbständiges.

Die beiden weitern in Betracht zu ziehenden Namen sind *Gloeosporium tubercularioides* Sacc. und *Gloeosporium curvatum* Oudem. Von Arx (1957) hat beide an Hand von Typusmaterial untersucht; die erste Art muss darnach gestrichen werden, da sich auf dem betreffenden Material nur ein *Aspergillus* aus der *glaucus*-Gruppe befand, während *Gloeosporium curvatum* Oudem. (beschrieben von *Ribes nigrum* L.) mit *Gloeosporidiella ribis* f. sp. *nigri* zusammenfällt.

Nach dieser Zusammenfassung der bisher bekannten Tatsachen über die systematische und biologische Aufteilung des Krankheitserregers auf *Ribes*-Arten, scheint es am einfachsten zu sein, die Hauptfruchtform auf *Ribes grossularia* L. systematisch unterzubringen. Es handelt sich — das Fehlen von Infektionsversuchen scheint in diesem Falle unerheblich — um die f. sp. *grossulariae* Kleb., welche damit in denselben Rang kommt wie die beiden übrigen von Klebahn (1918) unterschiedenen biologischen Rassen. Die gefundene Hauptfruchtform auf *Ribes grossularia* zeigt aber eine morphologische Besonderheit (vgl. Abbildung 2); es scheint deshalb angezeigt, die Form auch zu beschreiben:

Drepanopeziza ribis (Kleb.) v. Höhn. f. sp. *grossulariae* Kleb.
Konidienform: *Gloeosporidiella ribis* (Lib.) Petr. f. sp. *grossulariae* Kleb. Wirt: *Ribes grossularia* L.

Die dem Substrat zunächst vollständig eingesenkten, später meist auf der Blattunterseite durchbrechenden Apothecien sind knollig,

schwarz, fast sklerotienartig, 300—350 μ gross und sie wachsen einzeln oder in kleinen Gruppen. Das Excipulum ist 20—30 μ dick und es besteht aus 8—12 μ grossen, nur zu äusserst derbwandigen, innen meist ziemlich dünnwandigen, dunkelbraunen, gegen innen auch allmählich heller werdenden, polyedrischen, deutlich eckigen Zellen. Aussen wird es teilweise durch die aufgewölbten Substratschichten umschlossen und seitlich und unten dringen spärlich kurzgliederige, bräunliche Hyphen oder kleinere Stromakomplexe aus rundlichen, bräunlichen Zellen in das zerstörte Wirtsgewebe. Nach innen folgt basal eine bis 60 μ mächtige Schicht aus bis 20 μ grossen, zum Teil recht locker ineinander verflochtenen, unregelmässig ecki-

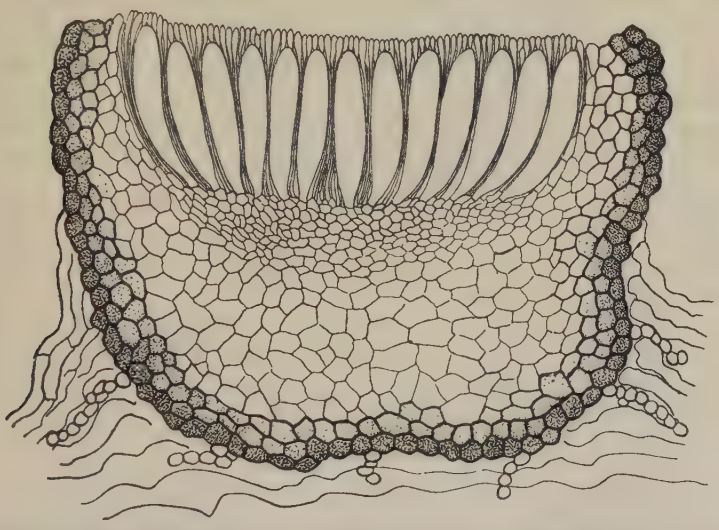

Abbildung 2. Schnitt durch ein Apothecium von *Drepanopeziza ribis* f. sp. *grossulariae* auf *Ribes grossularia.* Vergr. 250×.

gen, ziemlich zartwandigen und hyalinen Zellen, die in reifen Apothecien leer sind. Darüber folgt erst das Hypothecium aus kleinen, etwas gestreckten, zartwandigen, hyalinen, in nach aussen und oben divergierenden Reihen angeordneten Zellen.

Die Asci sind 80—100 ⇌ 17—20 μ gross, keulig oder schmal ellipsoidisch, am Scheitel sich schwach verjüngend und dann breit abgerundet, einfach- und zartwandig und am Scheitel mit charakteristisch gebautem Apikalapparat versehen (kugeliger oder liegend ellipsoidischer, sich mit Jodlösung nicht sehr intensiv blau anfärbender, von einem nach aussen mündenden, feinen Kanal druchbohrter Körper). Sie sind unten mehr oder weniger deutlich gestielt; die Stiele sind gegen das Zentrum der Basis gerichtet. Zahlreiche Paraphysen, welche hyalin und fädig und oben etwas keulig verdickt sind, umgeben die Asci. Die zu je acht im Ascus undeutlich zwei-

bis dreireihig liegenden Ascosporen sind breit ellipsoidisch, manchmal schwach keulig, hyalin, 12—15 ⇌ 6—7,5 μ gross.

Fundorte: auf überwinterten Blättern von *Ribes grossularia* L. — Frankreich, Hautes Alpes, Val Queyras, Aiguilles am 11. 6. 1954 und Aiguilles, Chalvet ca. 2000 m. s. m. am 30. 6. 1958.

Klebahn (1906, 1918) hat sowohl Apothecien von *Ribes rubrum* wie auch von *Ribes nigrum* gezeichnet. Diese unterscheiden sich deutlich von unserer Form auf *Ribes grossularia*. Die Form auf *Ribes rubrum* besitzt eine stielartige Verankerung im Wirtsgewebe und die Basis ist — ähnlich wie bei der vorliegenden Form, aber weniger intensiv — von einem hyalinen, stromatischen Gewebe erfüllt. Der Form auf *Ribes nigrum* fehlt ein solches stromatisches Gewebe; die Apothecien sind hier mehr schüsselförmig. Es ist an Hand des bis heute nur spärlichen Herbarmaterials schwierig zu entscheiden, wie weit diese beobachteten Unterschiede konstant sind, und es müsste für diesen Fall noch geprüft werden, wie weit durch den Wirt die Morphologie der in ihm gebildeten Apothecien beeinflusst wird.

Dasselbe ist von den Sporendimensionen zu sagen. Für die Form auf *Ribes rubrum* gibt Klebahn 12—17 ⇌ 7—8 μ, für diejenige auf *Ribes nigrum* 10—14 ⇌ 5—6 μ, also wesentlich weniger an. Die Form auf *Ribes grossularia* steht in den Sporenmassen zwischen diesen Formen (12—15 ⇌ 6—7,5 μ), doch ist es auch hier schwierig, jeweilen zu entscheiden, ob die gemessenen Sporen voll ausgereift seien. Leider war es, da die Sporen nur schwierig aus den Asci befreit werden konnten, an Hand des vorliegenden Materials nicht möglich, eine statistische Auswertung vorzunehmen.

Bei der Form auf *Ribes petraeum* Wulfen ist die Frage nach der biologischen Zugehörigkeit und demgemäss nach der Benennung ohne Infektionsversuche nicht zu entscheiden. Klebahn (1906, 1918) hatte diese *Ribes*-Art nicht in seine Infektionsversuche einbezogen. Immerhin unterteilte er seine *Ribes rubrum*-Formen in eine Gruppe a) und eine Gruppe b), die sich insofern biologisch unterschiedlich verhielten, als die f. sp. *grossulariae* wohl *rubrum* a), nicht aber auch *rubrum* b) zu infizieren vermochte. Die Pflanzen der beiden *Ribes rubrum*-Gruppen unterschieden sich nach Klebahn (1918) durch die Form ihrer Blattzipfel; bei *rubrum* a) rundlich-zackig, bei *rubrum* b) spitz. Lüstner (1908) fand, dass die grünblühenden Johannisbeersorten stärker vom Pilz befallen werden als die rotblühenden und dass insbesondere die Rote Holländische Johannisbeere weitgehend resistent ist. Gerade diese Sorte besitzt aber — mit Ausnahme des Beerengeschmackes — die morphologischen Merkmale von *Ribes petraeum* Wulfen. Es ist deshalb naheliegend, auch für die Klebahn'sche Gruppe b) hybridogenen Ursprung zwischen *rubrum* und *petraeum* anzunehmen.

Trotzdem wissen wir von der in den Alpen auf *Ribes petraeum* Wulfen gefundenen *Drepanopeziza* und ihrer der *Gloeosporidiella ribis* entsprechenden Nebenfruchtform nicht, ob sie mit einer Klebahn'schen biologischen Form identisch ist oder nicht. Der Pilz kann daher wohl als *Drepanopeziza ribis* (Kleb.) v. Höhn. eingereiht werden; seine Zuteilung zu einer biologischen Form muss später auf

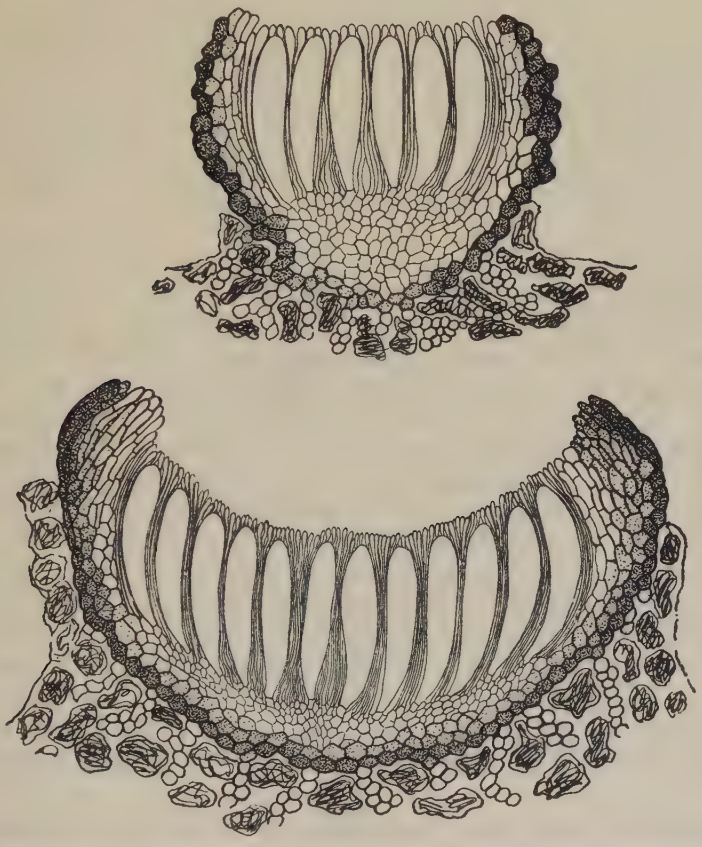

Abbildung 3. Schnitte durch die Apothecien von oben: *Drepanopeziza variabilis* auf *Ribes alpinum*, und unten: *Drepanopeziza ribis* auf *Ribes petraeum*. Vergr. 250 ×.

Grund von Infektionsversuchen erfolgen. Da auch die Apothecien dieser Form eine charakteristische Morphologie aufweisen, sei sie hier beschrieben:

Die dem Substrat zunächst eingesenkten, später durchbrechenden und sich schüsselförmig öffnenden Apothecien besitzen einen Durchmesser von 300—350 μ und eine Höhe von 150—200 μ. Das 20—25 μ dicke Excipulum besteht aus unregelmässig eckigen, nur

zu äusserst sehr derbwandigen, nach innen zu zartwandigen, braunen, 8—12 μ grossen Zellen. Am Margo werden diese Zellen etwas gestreckt und sind auch in deutlichen Reihen angeordnet. Basal folgt nach innen eine dünne Schicht aus hyalinen, zartwandigen Zellen, an die sich nach oben die Fruchtschicht anschliesst. Diese entspricht sowohl in der Anordnung wie auch in den Massen derjenigen von der f. sp. *grossulariae.* Die Sporen sind hier 11—14 ⇌ 5,5—7,5 μ gross. Das intramatrikale Pseudostroma ist bei der Form auf *Ribes petraeum* aber deutlich stärker ausgebildet als bei der f. sp. *grossulariae.*

Vergleichen wir die Apothecien auf *Ribes petraeum* mit der Klebahn'schen Zeichnung von f. sp. *nigri,* so fällt eine weitgehende Übereinstimmung der beiden Formen auf. *Drepanopeziza ribes* f. sp. *nigri* hat nach Klebahn (1918) nur etwas stärker hervorbrechende, mit einem schwächern Margo versehene Apothecien als unsere vorliegende Form.

Die Drepanopeziza auf *Ribes alpinum* L. besitzt im Prinzip einen ähnlichen Bau wie die oben beschriebenen und die von Klebahn (1906, 1918) aufgestellten Formen. Die geringfügigen Abweichungen zu diesen sind nicht grösser als diejenigen der vier bis jetzt bekannten Formen unter sich. Auch die Ascus- und Sporenformen, sowie deren Grössen bewegen sich im Rahmen der Formen von *Drepanopeziza ribis.* Hingegen unterscheiden sich die Konidien auf *Ribes alpinum* L., was auch für den vorliegenden Fall beobachtet werden konnte, deutlich von der Konidienform von *Drepanopeziza ribis,* weshalb auch die *Ribes alpinum* L. bewohnende Form als eigene Art, nämlich *Gloeosporidiella variabilis* (Laub.) Nannf. geführt wird. Klebahn (1918) hat dies auf Grund zahlreichen Materials geprüft und gefunden, dass die Konidien der *Gloeosporidiella variabilis* 2,8—3 μ, diejenigen der *Gloeosporidiella ribis* 4—6 μ, seltener weniger als 4 μ breit sind, und dass ausserdem die Konidien von *Gloeosporidiella variabilis* einen merklich grösseren Krümmungsradius der konvexen Seite besitzen, nämlich 12—18 Einh. gegenüber meist 6—10 Einh. bei *Gloeosporidiella ribis.*

Dieser an und für sich geringfügige morphologische Unterschied wird aber durch die Biologie unterstützt; denn Klebahn (1906, 1918) konnte mit keiner seiner drei f. sp. *Ribes alpinum* L. infizieren; es besteht demnach eine natürliche Barriere zwischen diesen Pilzen. Wir betrachten deshalb die *Drepanopeziza* auf *Ribes alpinum* L. als eigene Kleinart, welche wir *Drepanopeziza variabilis* nennen:

Drepanopeziza variabilis nov. spec.

Konidienform: *Gloeosporium variabile* Laubert — Naturw. Zeitg. f. Land- und Forstwirtschaft **2**, 56 (1904).

Gloeosporidiella variabilis (Laub.) Nannf. — Nov. Act. Reg. Soc. Scient. Upsal. ser. 4, **8**, 171 (1932).

Gloeosporidiella variabile (Laub.) v. Arx — Verhandl. Konikl. Neederl. Ak. Wtsch. a. Natuurk, 2. Reeks, **51**, 146 (1957).
Matrix: *Ribes alpinum* L. (Mitteleuropa).

Apohecia paene globosa, 150—200 μ diam. et matura erumpentia, base substrato pediculo lato innata et circumdata dense pseudostroma, quae composita cellulis brunneis, plusminusve globosis et partialiter structuram substratae dissolvit. Excipulum 15—20 μ crass, parte exteriore circumdatum strato singulo vel stratis duobus compositis cellulis 8—14 μ magnitudine, polyedricis, brunneis, parietibus modicus solidis. In partem interiorem cellulae parviores, clariores et parietibus tenuioribus et parte intima planissimae et distincte in ordinibus. Pediculum base cellulis hyalinis, polyedricis, 6—10 μ magnitudine, parietibus tenuibus compositum. Asci paralleles, anguste ellipsoidei, 80—100 ⇌ 16—20 μ magnitudine, pariete tenue et simplice, in apice modo incrassata et poro Jodo coerulescente, 8-spori. Asci circumdati multis paraphysibus, filiformibus, apice distincte clavatis, hyalinis, nonnumquam pituitose cohaerentibus. Sporae 1-cellulatae hyalinae late ellipsoideae vel paulum clavatae, 13—18 ⇌ 6—7,5 μ magnitudine.

In foliis emortius *Ribis alpini* L. habitat. — Gallia, Dept. Hautes Alpes, Val Queyras, Aiguilles, 26. 6. 1958.

Die 150—200 μ Durchmesser aufweisenden und fast ebenso hohen Apothecien brechen früh nach aussen durch. Sie sind nur auf der Blattunterseite zu finden und hier basal mit einem breiten Fuss dem Substrat eingesenkt und von einem dichten, das Wirtsgewebe zum Teil auflösenden Pseudostroma aus hellbraunen, meist mehr oder weniger kugeligen Zellen umgeben. Das Excipulum ist 15—20 μ dick, aussen von einer einzigen, seltener zwei Schichten aus 8—14 μ grossen, polyedrischen, braunen, ziemlich derbwandigen Zellen umgeben. Nach innen folgen etwas kleinere, zartwandigere und hellere Zellen und zuinnerst sind diese plattenförmig und in deutliche Schichten geordnet. Der basale Fussteil setzt sich aus hyalinen, polyedrischen, zartwandigen, 6—10 μ grossen Zellen zusammen. Die parallel nebeneinander stehenden Asci sind schmal ellipsoidisch, 80—100 ⇌ 16—20 μ gross, mit einer einfachen, zarten Wand umgeben, welche nur in den Scheitelpartien etwas verdickt ist und hier einen sich mit Jod hellbau anfärbenden, in der Mitte von einem Porus durchbohrten, kugeligen oder liegend ellipsoidischen Quellkörper umschliesst. Sie sind von zahlreichen ziemlich breit fädigen, oben deutlich keulig erweiterten, hyalinen, manchmal schleimig verklebten Paraphysen umgeben und sie enthalten je acht einzellige, hyaline, breit ellipsoidische oder etwas keulige, 13—18 ⇌ 6—7,5 μ grosse Ascosporen. (Abb. 4, h—l).

4. *Coccomyces ursinus* (Sacc. et Paol.) Petr.

Auf dem Material von *Arctostaphylos uva ursi* (L.) Sprengel, das uns von Dr. H. Hess aus dem Oberhalbstein (Kt. Graubünden) ge-

bracht worden ist, konnten wir neben dem Imperfekten *Anomomyces arbuticolus* (Sow.) v. Höhn. nicht weniger als vier verschiedene Discomyceten finden. Wir möchten nachfolgend auf diese eintreten, da sie zum Teil neu, zum Teil aber auch recht selten und in ihrer Stellung unsicher sind.

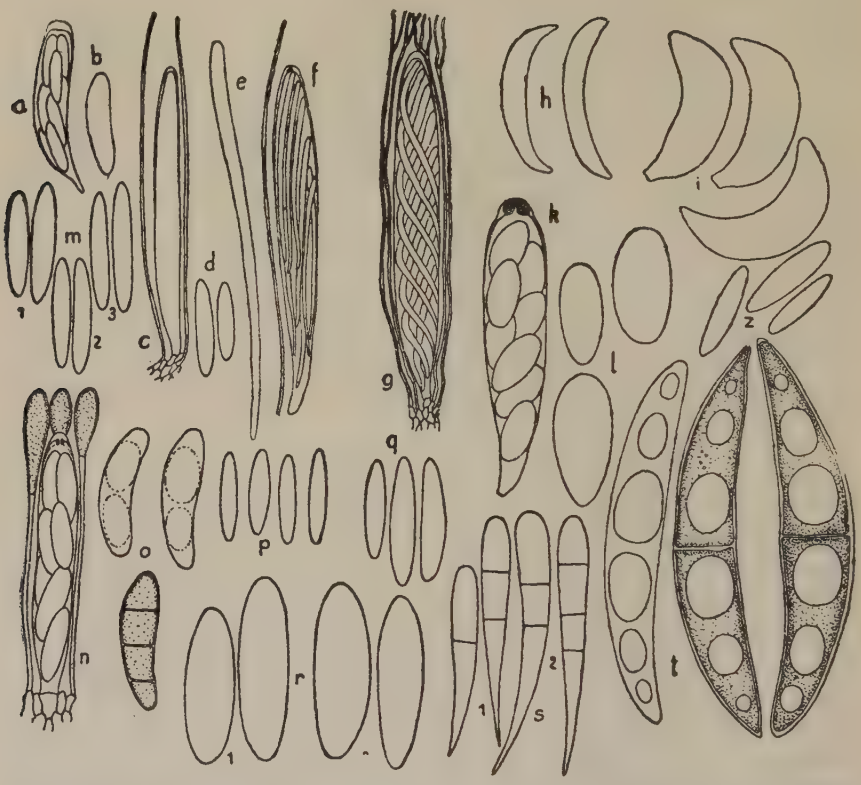

Abbildung 4. Ascus- und Sporenformen verschiedener Discomyceten. a) Ascus von *Laetinaevia setosa*; b) Ascospore von *Laetinaevia setosa*; c) Ascus von *Trichodiscus sedi*; d) Ascospore von *Trichodiscus sedi*; e) Ascospore von *Coccomyces ursinus;* f) Ascus von *Coccomyces ursinus* mit Paraphyse; g) Ascus mit Paraphysen von *Naemacyclus arctostaphyli*; h) Konidien von *Drepanopeziza variabilis*; i) von *Drepanopeziza ribis*; k) Ascus von *Drepanopeziza variabilis*; l) Ascosporen von *Drepanopeziza variabilis*; m) Ascosporen von *Pyrenopeziza Morthieri*; 1. von *Trollius europaeus;* 2. von *Anemone alpina;* 3. von *Geranium pyrenaicum;* n) Ascus mit Paraphysen von *Eupropolella arctostaphyli*; o) Ascosporen von *Eupropolella arctostaphyli*, oben: jung; unten: ausgereift; p) Ascosporen von *Pyrenopeziza arctostaphyli*; q) von *Pyrenopeziza linicola*; r) von *Pyrenopeziza denigrata*, 1. von *Anthericum*; 2. von *Asphodelus*; s) Ascosporen von *Pyrenopeziza euphrasiae*, 1. von *Onobrychis*; 2. von *Euphrasia*; t) Ascosporen von *Chaetinaevia Nannfeldtii*, links: jung; rechts: ausgereift; u) Ascosporen von *Pyrenopeziza sedi*. Vergrösserungen: Asci 500×; Sporen 1000×.

Der erste dieser erwähnten Discomyceten *Coccomyces ursinus* (Sacc. et Paol.) Petr. wurde von Saccardo und Paoletti (1889) zunächst als *Coccomyces quadratus* (Schum.) Karsten var. *ursinus* Sacc. et Paol. beschrieben und später von Petrak (1936) auf Grund von bulgarischem Material nachuntersucht. Er verglich den Pilz auf *Arctostaphylos uva ursi* (L.) Sprengel mit dem typischen *Coccomyces quadratus* (Schum.) Karst., welcher auf *Vaccinium*arten, z. B. *Vaccinium Vitis idaea* L. und *Vaccinium myrtillus* L. vorkommt. Er kam zum Schluss, dass sich der auf *Arctostaphylos* wachsende Pilz genügend sicher von *Coccomyces quadratus* unterscheiden lasse, um ihn als eigene Art zu führen, weshalb er die neue Kombination *Coccomyces ursinus* (Sacc. et Paol.) Petr. einführte.

Wir haben den Pilz auf Grund unseres alpinen Materials ebenfalls untersucht und können Petrak's Auffassung bestätigen. Die Sporen beider Arten lassen sich vor allem durch ihre Grösse unterscheiden. Bei *Coccomyces ursinus* sind sie durchschnittlich kleiner als bei *Coccomyces quadratus,* nämlich 45—68 ⇌ 2—2,5 µ gegenüber 65—90 ⇌ 2,5—3 µ. Daneben existieren auch kleinere Unterschiede im Fruchtkörperaufbau, besonders auch im Excipulum, sowie im Öffnungsmechanismus der Fruchtkörper. Wir möchten daher noch auf die ausführlichen Beschreibungen von *Coccomyces ursinus* bei Petrak (1936) und von *Coccomyces quadratus* bei Terrier (1942) verweisen (Abb. 4, e und f).

Über die Verbreitung des Pilzes wissen wir wenig. Petrak (1936) schreibt, dass es sich anscheinend um eine sehr seltene, aber weit verbreitete Art handle. Er gibt keine weitern Einzelheiten, möglicherweise standen ihm auch nicht mehr Angaben als diejenige der Originalbeschreibung (aus Sibirien) und sein damaliger Fund aus Bulgarien zur Verfügung.

Für die Alpen besteht vorderhand noch keine Literaturstelle, die sich eindeutig auf diesen Pilz beziehen würde. Der als *Coccomyces quadratus* var. *arctostaphyli* Rehm beschriebene Pilz ist nämlich nach Rehm's (1912) eigenen Angaben nicht mit diesem Pilz, sondern mit *Naemacyclus arctostaphyli* (Ferd. et Winge) Rehm identisch; unter dieser Bezeichnung könnte er aber vereinzelt in den Herbarien vorhanden sein.

Unser Fund: auf *Arctostaphylos uva ursi* (L.) Sprengel, Kt. Graubünden, Oberhalbstein, Alp. Flix, 2450 m. s. m. 10. 9. 1958, leg. H. Hess

steht aber trotzdem nicht allein. Wir fanden den Pilz auch im Herbar unserer Hochschule auf demselben Wirt von:

Kt. Wallis, Zermatt, unterwegs nach Grünsee-Riffelalp, bei der Eisenbahnlinie, 23. 10. 1938, leg. Ch. Terrier,

und eine weitere Angabe stammt von Dr. S. Blumer, der Material aus dem Berneroberland an Herrn Prof. Petrak gesandt hat, welches ebenfalls als *Coccomyces ursinus* bestimmt worden ist. Leider

ist auf dem uns übergebenen Rest nur noch *Naemacyclus arctostaphyli* zu finden. Der Pilz ist aber sicher aus den Alpen nachgewiesen und wird — wie dies schon Petrak (1936) angedeutet hat — noch weiter verbreitet sein.

5. *Naemacyclus arctostaphyli* (Ferd. et Winge) Rehm.

Der zweite, auf *Arctostaphylos uva ursi* (L.) Sprengel festgestellte Pilz, *Naemacyclus arctostaphyli* (Ferd. et Winge) Rehm ist für die Alpen schon mehrmals nachgewiesen worden (Rehm, 1907, Va, 1912). Doch muss auch dieser für das Gebiet als ziemlich selten betrachtet werden, während er nach Ferdinandsen und Winge (1907, 1908) in Dänemark ziemlich häufig auftritt. Leider besteht in Bezug auf diese Art systematisch noch Unsicherheit und nomenklatorisch eine Konfusion. Da zudem Verwechslungsmöglichkeit mit *Coccomyces ursinus* (Sacc. et Paol.) Petr. besteht, erscheint es zweckmässig, den Pilz noch kurz zu beschreiben.

Dieser Discomycet wurde fast gleichzeitig unter zwei verschiedenen Namen, einmal als *Stictis arctostaphyli* Ferd. et Winge (Ferdinandsen und Winge, 1907) und als *Naemacyclus Penegalensis* Rehm (Rehm, 1908) beschrieben, nachdem Rehm (1907 a) ihn wohl benannt (nämlich als *Coccomyces quadratus* var. *arctostaphyli*), nicht aber mit einer Diagnose versehen hatte. Rehm (1912) erwähnt ihn dann sogar unter zwei verschiedenen Namen. Einmal stellt er ihn wiederum als var. *arctostaphyli* zu *Coccomyces quadratus*, dann führt er für ihn die neue Kombination *Naemacyclus arctostaphyli* (Ferd. et Winge) Rehm ein.

In Bezug auf die Gattungszugehörigkeit stehen sich die Auffassungen von Ferdinandsen und Winge (1907, 1909) einerseits und von Rehm (1908, 1912) anderseits gegenüber. Die ersteren wollten den Pilz bei *Stictis* Pers., Rehm bei *Naemacyclus* Fuck. unterbringen. Wir sind dieser Frage ebenfalls nachgegangen. Nach Nannfeldt (1932) gehört *Stictis* Fuck. [mit dem Typus *Stictis radiata* (L.) Pers.] zu den *Ostropales*, deren Asci am Scheitel mehr oder weniger deutlich halbkugelig angeschwollen sind und hier auch einen feinen, diese Anschwellung durchbohrenden Kanal besitzen. Eine solche Morphologie kommt dem *Arctostaphylos* bewohnenden Pilz nicht zu. Hingegen stimmt er in wesentlichen Merkmalen gut mit *Naemacyclus niveus* (Pers.) Sacc. überein; der Zuteilung bei *Naemacyclus* Fuck., wie dies schon Rehm (1912) vorgeschlagen hat, steht somit nichts im Wege. Bei beiden Pilzen können wir einen ähnlichen Wandaufbau beobachten, die Asci sind praktisch gleich gebaut und bei beiden Arten ist die leichte Drehung der Ascosporen im Ascus nicht zu übersehen.

Hingegen ist die Stellung der Gattung *Naemacyclus* Fuck. selber noch unklar. Nannfeldt (1932) schreibt, dass der Gattung der

für die *Ostropales* charakteristische Bau der Ascusspitze fehle, der Pilz deshalb nicht in die Konzeption dieser Ordnung passe. Seiner Ansicht steht diejenige von Petrak (1947) gegenüber; er stellt *Naemacyclus niveus* ausdrücklich in die Nähe der typisch ostropal gebauten Gattung *Stictis* Pers. Nach unseren Untersuchungen kann die Gattung aber tatsächlich nicht zu den *Ostropales* gestellt werden, wollte man diese, im Nannfeldt'schen Umfange gut charakterisierte Ordnung nicht verwässern. Wohin aber die Gattung letztendlich gehört, können wir ebenfalls nicht entscheiden. Nannfeldt (1932) hat wohl in seiner Einleitung noch einige Familien der *Helotiales* angedeutet, nicht aber richtig aufgestellt; möglicherweise gehört *Naemacyclus* — vielleicht zusammen mit *Keithia* Sacc. — in eine derartige Familie. Zu erwähnen ist jedoch, dass auch Anklänge zu den *Phacidiales* bestehen; für eine eindeutige Stellungnahme reichen aber unsere Untersuchungen und die daraus gewonnenen Erfahrungen nicht aus.

Nachfolgend möchten wir den Pilz noch beschreiben:

Die meist auf der Blattunterseite der abgestorbenen Blätter zerstreut wachsenden, epidermal angelegten, später durchbrechenden und die Kutikula lappig aufsprengenden Apothecien sind im Umriss unregelmässig rundlich; sie variieren im Durchmesser von 400—900 μ, ihre Höhe beträgt (Fruchtschicht mit Hypothecium und basalem Excipulum) 130—150 μ. Reif ist die Fruchtschicht entblösst und hell gefärbt. Das Excipulum ist an der Basis undeutlich gegen das Substrat abgegrenzt und besonders im Zentrum stark, fast stielartig eingewachsen, dabei hell und aus eng ineinander verflochtenen, zartwandigen, oft hyphigen Zellen aufgebaut. Diese ordnen sich allmählich in schwach divergierende, mehr oder weniger senkrecht gestellte Reihen, gegen oben werden sie kubisch und kleiner (nur 3—5 μ gross); ohne merklichen Übergang folgt dann die Fruchtschicht. Seitlich ist das Excipulum mit den aufgewölbten Partien der Wirtsepidermis verwachsen. Die Lumina der ursprünglichen Epidermiszellen sind von plattenförmigen, zartwandigen, bräunlichen Zellen erfüllt, daran schliessen sich nach innen einige durchgehende Lagen gleich gebauter Zellen an, aus denen senkrecht zu diesen und nach dem Fruchtkörperinnern gerichtete, dornenartige, ziemlich stark quellbare, hyaline Zellen ragen.

Die zahlreichen dicht nebeneinander stehenden Asci sind zart- und einfachwandig, oben konisch, fast etwas zugespitzt und sie lassen sich am Scheitel durch Jod nicht färben; dabei sind sie zylinderisch oder schwach keulig, 80—95 ⇌ 10—12 μ gross und dem Hypothecium breit aufsitzend. Sie sind von zahlreichen fadenförmigen, oben schwach verbreiterten, undeutlich und nur schwach verästelten Paraphysen nur wenig überragt. Die zu je acht parallel umeinander

gewundenen, fädigen, oben am breitesten, sich nach unten allmählich verjüngenden, 70—85 ⇌ 2—2,5 μ grossen Ascosporen sind hyalin und ungefärbt. (Abb. 4, g).

Nachfolgend sollen noch einige der wesentlichsten Differentialmerkmale von *Coccomyces ursinus* (Sacc. et Paol.) Petr. und *Naemacyclus arctostaphyli* (Ferd. et Winge) Rehm gegeben werden, da die beiden Pilze unter Umständen verwechselt werden könnten:

Coccomyces ursinus.	*Naemacyclus arctostaphyli*
Apothecien deutlich dunkel, meist auf rötlich verfärbten Blättern	Apothecien hell, in grau verfärbten Blättern
Asci mit deutlicher Jodfärbung	Asci ohne Jodfärbung
Ascosporen parallel, nicht umeinander gewunden	Ascosporen parallel, deutlich umeinander gewunden.

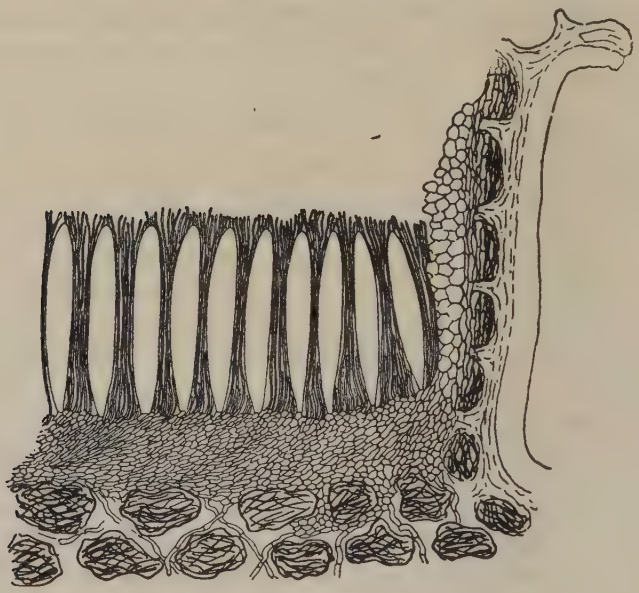

Abbildung 5. Schnitt durch eine Fruchtkörperpartie von *Naemacyclus arctostaphyli*, rechts das Excipulum mit verwachsener Substratepidermis, Vergr. 250 ×.

6. **Eupropolella arctostaphyli** nov. spec.

Auf Grund der Tatsache, dass die Gattung *Sphaeropezia* Sacc. beurteilt nach ihrem Typus, *Sphaeropezia alpina* (Sacc.) Sacc. (auf *Dryas octopetala* L.) mit *Phacidium* Fr. zusammenfällt (Müller und von Arx, 1955), hat Müller (1957) für *Sphaeropezia vaccinii* (Rehm) Rehm, die von v. Höhnel (1917) aufgestellte Gattung *Eupropolella* näher umschrieben und diese monotypische Gattung in die Nähe der *Naevioideae* (*Dermateaceae*) sensu Nannfeldt (1932) gestellt.

Auf dem schon mehrmals erwähnten Material von *Arctostaphylos uva ursi* (L.) Sprengel haben wir nun einen dem Typus von *Eupropolella* v. H. [*Eupropolella vaccinii* (Rehm) v. H.] sehr ähnlichen Pilz gefunden, welcher sich vor allem durch etwas grössere Sporen von diesem unterscheidet. Dieser Fund gab uns Veranlassung, nochmals auf die Stellung von *Eupropolella* im System zurückzukommen.

Auf Grund von neueren Erfahrungen haben wir unsere beiden Pilze (*Eupropolella vaccinii* und seinen Verwandten auf *Arctostaphylos*) mit einigen von Nannfeldt (1932) und Dennis (1956) zu *Durella* Tul. gestellten Pilzen verglichen. Wir sind daraufhin zum Schluss gekommen, *Eupropolella* müsse *Durella* zum mindesten sehr nahe stehen, wenn nicht überhaupt mit dieser Gattung vereinigt werden. Da wir uns nicht kompetent fühlten, diese Frage definitiv zu entscheiden, haben wir uns an zwei erfahrene Discomycetenkenner, an die Herren Dr. R. W. G. Dennis (Kew, England) und W. D. Graddon (Congleton, Cheshire, England) gewandt. Für ihre rasche und uneigennützige Hilfe möchten wir beiden Herren herzlich danken.

Dr. Dennis schreibt darüber: „... the structure of the apothecium is certainly Durelloid but I do not like stretching *Durella* to incorporate these deeply immersed apothecia on dead leaves. I should keep up *Eupropolella* at least for the present", und Herr Graddon: „... I do not think that *Eupropolella* is a synonym of *Durella* ... we find (in *Durella*) a very well-developped lateral excipulum of stout (often brown) hyphae whereas in *Eupropolella* there seems to me to be little or no lateral excipulum. Further all known *Durella* species are on wood or woody shrubs."

Diese übereinstimmende Auffassung beider Herren macht es uns leicht, unsern Pilz auf *Arctostaphylos* als zweite Art zur Gattung *Eupropolella* v. H. und diese als zweite Gattung zur Nannfeldtschen Unterfamilie der *Durelloideae* (*Helotiaceae*) zu stellen:

Eupropolella arctostaphyli nov. spec.

Apothecia prope semper partibus inferioribus foliorum erumpentia, dense gregata, globosa, 250—350 μ diam. et 130—160 μ altitudine obscura et lateraliter circumdata laciniis cuticulae fissae. Excipulum base cellulis saepe quomodo stroma innexis, parte interiore hyalinis, parte exteriore brunneis compositum plus minusve polyedricis et 4—7 μ magnitudine. Centro pediculum formatum, quod alte in parenchymum descendet et de quo paucae hyphae hyalinae in substratum penetrant. Lateraliter tela pseudostromatica longe sub cuticulam extendet. Hymenio asci dense paralleli, clavati vel late ellipsoidei, 70—90 ⇌ 10—12 μ magnitudine et paraphyses filiformes, hyalinae, apice clavatae, leniter brunneae et interdum ramosae et epithecium formantes. Asci parietibus tenuibus et poro Jodo coerulescente, 8-spori. Sporidia

plerumque 2-seriata, cylindrica aut paulum clavata, plerumque curvata, 17—23 ⇌ 4—5 μ magnitudine, initio 1-cellulata et hyalina, ultimo septis usque ad 4-cellulata et brunnea.

Ad folias siccas *Arctostaphyli uvae ursi* (L.) Sprengel collectum in Raethia, Alp Flix (Oberhalbstein) 10. 9. 1958, leg. H. Hess.

Die fast ausschliesslich auf der Blattunterseite dicht nebeneinander hervorbrechenden, zuweilen einander berührenden, im Umriss rundlichen, scheibenförmigen, 250—350 μ Durchmesser aufweisenden und 130—160 μ hohen Apothecien sind dunkel gefärbt, und von den Lappen der aufgebrochenen Kutikula umschlossen. Das Excipulum besteht basal aus mehr oder weniger deutlich ausgebildeten, zuweilen fast stromatischen, ineinandergreifenden, innen hyalinen, am Rande

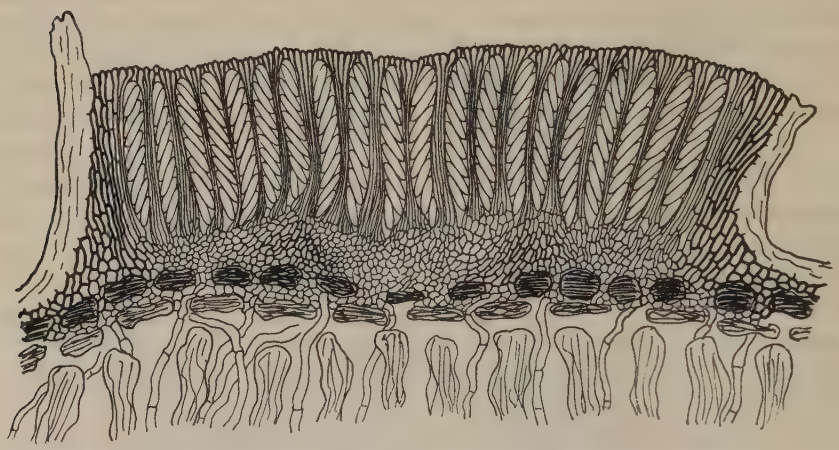

Abbildung 6. Schnitt durch ein Apothecium von *Eupropolella arctostaphyli*. Vergr. 250 ×.

bräunlichen, nicht sehr derbwandigen, polyedrischen oder ziemlich unregelmässigen, 4—7 μ grossen Zellen. Im Zentrum lässt sich ein zapfenartiger, bis ins Schwammgewebe dringender, stromatischer Fuss erkennen, von dem aus spärliche, hyaline Hyphen weit in das Wirtsgewebe dringen. Seitlich setzt sich dieses Gewebe unter der Kutikula ziemlich weit fort und verbindet oft die einzelnen Apothecien miteinander; vom Rande aus steigen auch senkrecht gestellte Reihen aus bräunlichen, zunächst kurzgliederigen, weiter oben fädigen, zartwandigen, nur wenige Schichten umfassenden Zellen und bilden so das laterale Excipulum.

Das Hymenium umfasst dicht parallel nebeneinander stehende, keulige oder breit ellipsoidische, 70—90 ⇌ 10—12 μ grosse, unten breit aufsitzende Asci und fädige, hyaline, sich nach oben etwas verzweigende und sich zu oberst keulig erweiternde, und bräunlich verfärbende, in ein dichtes Epithecium verwobene Paraphysen. Die Asci

sind zartwandig, am Scheitel verjüngen sie sich und sind zu oberst ziemlich breit abgestutzt, wobei sie einen sich mit Jodlösung blau anfärbenden Apikalapparat einschliessen. Die zu je acht, zweireihig oder schräg einreihig angeordneten Ascosporen sind zylinderisch oder schwach keulig, meist gekrümmt, 17—23 ⇌ 4—5 µ gross, zunächst einzellig und hyalin, später durch Quersepten vierzellig und schwach rauchbraun gefärbt. (Abb. 4, n und o).

Eupropolella arctostaphyli besitzt im Vergleich zu *Eupropolella vaccini* vor allem längere Ascosporen, nämlich 16—23 µ, im Mittel 19,6 µ lange gegenüber 13—18 µ, im Mittel 15,3 µ lange bei *Eupropolella vaccinii.* Daneben sind auch die Fruchtkörper der vorliegenden Art im Durchschnitt etwas grösser und vor allem auch an der Basis stärker entwickelt und mit einem stielartigen, zentralen Fuss dem Substrat stärker eingesenkt. Es ist aber nicht daran zu zweifeln, dass sich die beiden Arten sehr nahe stehen.

7. **Pyrenopeziza arctostaphyli** nov. spec.

Der vierte auf *Arctostaphylos uva ursi* gefundene Pilz gehört zu *Pyrenopeziza* Fuck. Diese Gattung ist erst kürzlich (Hütter, 1958) einer eingehenden Bearbeitung unterworfen worden; unsere Befunde über diese sowie einige der nachfolgenden, zu *Pyrenopeziza* gestellten Formen basieren denn auch auf den dort gewonnenen Erkenntnissen.

Pyrenopeziza arctostaphyli nov. spec.

Apothecia subepidermaliter nascentia, maturissima forte erumpentia, initio clausa, dum globosa et aperta et paulum depressa, et ellipsoidea, 320—460 µ diametro et 300—400 µ altitudine. Apothecia substrato forte hyphis brunneis, 2—5 µ latis intexto base ca. 100 µ crassitudine innata. Excipulum sed distincte terminatum de hyphis. Base excipulum 60—100 µ crassitudine, lateraliter tenuius et perihymenialiter 40 µ crassitudine modo. Compositum multis stratis cellularum isodiametricarum, quae parte exteriore rotundatae, parietibus solidis et brunneis et 8—12 µ magnitudine, lateraliter ad partem interiorem ad 15 µ magnitudine, basaliter ad partem interiorem minores (4—7 µ) sunt. Ad hypothecium cellulae clariores, sed semper paulum brunneae. Margo compositus cellulis longitudinaliter extendis, 8—15 ⇌ 3—6 µ magnitudine, quae in fibras, parte exteriore brunneas, parte interiore hyalinis, 1—3-cellulatas, 20—50 ⇌ 3—6 µ magnitudine dissolvent. Hypothecium hyalinum, 20—30 µ crassitudine. Asci clavati, 8-spori, 50—65 ⇌ 5—8 µ magnitudine et poro Jodo coerulescente. Sporae hyalinae, 1-cellulatae, rectae vel saepe leniter curvatae, ellipsoideae vel forma fusi, 9—14 ⇌ 3—4 µ magnitudine. Paraphyses numerosae, filiformes, ca. 2 µ crassitudine et apice interdum ad 3 µ incrassatae.

Ad folias siccas *Arctostaphyli uvae ursi* (L.) Sprengel collectum. — Raetia, Oberhalbstein, Alp Flix, 10. 9. 1958, leg. H. Hess.

Die Apothecien des Pilzes werden subepidermal angelegt und brechen schon sehr frühzeitig und stark hervor; anfangs sind sie kugelig geschlossen, öffnen sich später rundlich und sind wenig niedergedrückt ellipsoidisch; sie messen 320—460 µ im Durchmesser und 300—400 µ in der Höhe. In dem intensiv mit dunklen, 2—5 µ breiten Hyphen durchsetzten Substrat sind die Fruchtkörper mit einer über 100 µ breiten Basis eingesenkt; dabei ist aber das Excipulum ziemlich scharf gegen das umliegende Hyphengeflecht abgegrenzt.

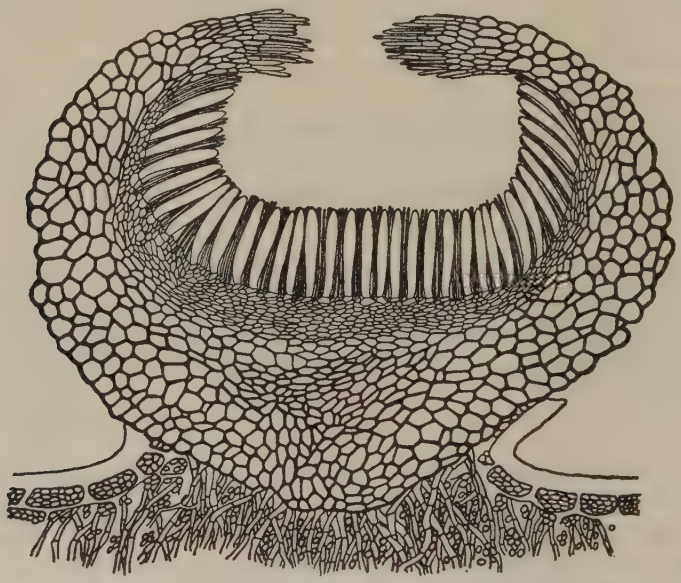

Abbildung 7. Schnitt durch ein Apothecium von *Pyrenopeziza arctostaphyli*. Vergr. ca. 170 ×.

Im basalen Teil ist das Excipulum 60—100 µ mächtig; es wird gegen den lateralen Teil allmählich dünner und misst perihymenial nur noch etwa 40 µ. Es besteht aus mehreren bis vielen Schichten isodiametrischer Zellen, welche gegen aussen abgerundet, dick- und dunkelwandig und 8—12 µ gross sind, lateral gegen innen bis 15 µ gross sein können, im basalen Teil aber gegen innen eher kleiner werden (4—7 µ). Gegen das Hypothecium werden die Zellen heller, sie sind aber auch da noch ein wenig bräunlich gefärbt. Der Margo besteht aus wenig longitudinal gestreckten, 8—15 ⇌ 3—6 µ grossen Zellen, welche in freie, gegen aussen hellbraune, gegen innen hyaline, 1—3-zellige, 20—50 ⇌ 3—6 µ grosse Randfasern auslaufen.

Das Hypothecium ist hyalin und 20—30 µ dick. Die Asci sind keulig, 8-sporig, 50—65 ⇌ 5—8 µ gross und besitzen einen mit Jod

färbbaren Apikalapparat. Die Sporen sind hyalin, einzellig, gerade oder oft wenig gekrümmt, elliposidisch bis spindelförmig, 9—14 ⇌ 3—4 µ gross. Die Paraphysen sind zahlreich, fädig, ca. 2 µ dick und gegen die Spitze manchmal wenig verbreitert (Abb. 4, p).

Unser Pilz steht in seinem ganzen Fruchtkörperbau, vor allem in der Ausbildung der sehr dicken basalen Partie des Excipulums und in der Ausbildung des Margo der *Pyrenopeziza Chailletii* Fuck. sehr nahe. Abgesehen vom Wirt (bei *Pyrenopeziza Chailletii*: *Chaerophyllum*) besitzt unsere vorliegende Art kleinere Sporen, die nur ungefähr halb bis zwei Drittel so gross sind wie diejenigen von *Pyrenopeziza Chailletii*. Unsere Form lässt sich daher sicher vom Gattungstypus unterscheiden. Es wäre auch zu betonen, dass bisher auf Ericaceen noch keine sicheren *Pyrenopeziza*-Arten bekannt geworden sind.

8. **Pyrenopeziza linicola** nov. spec.

Im Val Queyras (Hautes Alpes, Frankreich) haben wir auf *Linum alpinum* Jacq. eine weitere *Pyrenopeziza*art gesammelt, welche wir mit keiner bekannten Form identifizieren konnten. Sie sei nachstehend beschrieben:

Pyrenopeziza linicola nov. spec.

Apothecia subepidermaliter nascentia et plerumque forte erumpentia, initio globosa, posterius aperta, depressa et ellipsoidea, 250—400 µ diametro et 150—250 µ altitudine. In substrato hyphae plus minusve numerosae, 2—5 µ crassitudine, brunneae. Excipulum base 20—35 µ crassitudine, lateraliter paulum angustius et perihymenialiter 15—20 µ crassitudine, compositum cellulis isodiametricis, quae parte exteriore globosae, brunneae et 4—8 µ magnitudine, parte interiore distincte polyedricae, plus minusve hyalinae et 5—10 µ magnitudine sunt. Parte perihymeniale cellulae paulum elongatae et usque ad 15 µ longitudine. Margo cellulis 6—15 ⇌ 3—5 µ magnitudine compositus et in fibris dissolvet, quae parte exteriore brunneae, parte interiore hyalinae et quae 1- ad 3-cellulatae et 15—30 ⇌ 2—3 µ magnitudine. Hypothecium paene hyalinae et 15 µ crassitudine. Asci clavati, 8-spori, 50—70 ⇌ 8—15 µ, poro Jodo coerulescente. Sporae hyalinae, 1-cellulatae, rectae vel paulum curvatae, 12—16 ⇌ 3—4 µ magnitudine et 1-seriatae vel indistincte 2- ad 3-seriatae. Inter ascos paraphyses numerosae filiformes, hyalinae, 1—2 µ crassitudine, apice sensim ad 3 µ incrassatae.

Ad caules siccos *Lini alpini* Jacq. prope Aiguilles, Val Queyras, Hautes Alpes, Gallia, collectum 28. 6. 1958.

Die Apothecien werden subepidermal angelegt und brechen meist stark hervor. Anfangs sind sie kugelig geschlossen, öffnen sich später rundlich, sind niedergedrückt ellipsoidisch und messen 250—400 µ im

Durchmesser und 150—250 μ in der Höhe. Das Substrat wird von mehr oder weniger zahlreichen, 2—5 μ dicken, braunen Hyphen durchsetzt. Das Excipulum ist basal 20—35 μ dick, wird lateral nur wenig dünner und misst perihymenial noch 15—20 μ. Es besteht aus isodiametrischen Zellen, die gegen aussen rundlich, dick- und braunwandig und 4—8 μ gross, gegen innen deutlich polyedrisch, dünnwandiger und heller gefärbt und 5—10 μ gross sind. Im perihymenialen Teil sind die Zellen etwas longitudinal gestreckt und können bis 15 μ lang sein. Der Margo besteht aus 6—15 ⇌ 3—5 μ grossen Zellen und läuft in gegen aussen braunwandige, gegen innen fast hyaline Randfasern aus, die 1- bis 3-zellig sind und 15—30 ⇌ 2—3 μ messen.

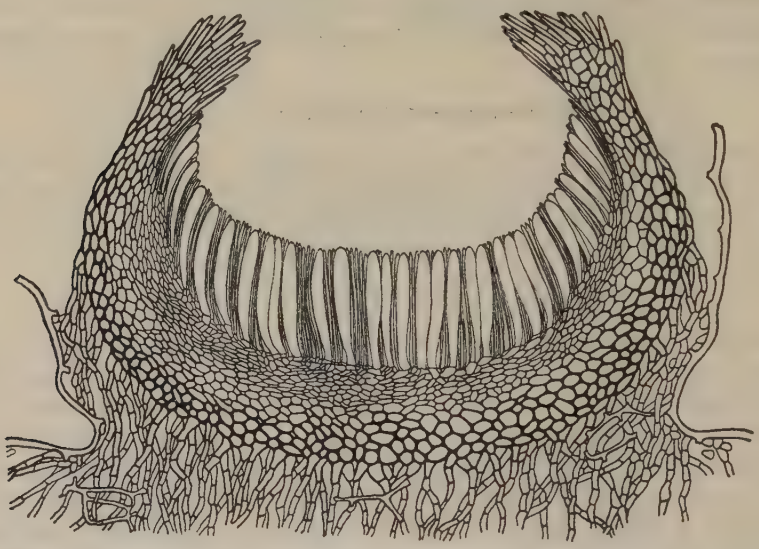

Abbildung 8. Schnitt durch ein Apothecium von *Pyrenopeziza linicola*. Vergr. ca. 170 ×.

Das Hypothecium ist fast hyalin und ca. 15 μ dick. Die Asci sind keulig, 8-sporig und 50—70 ⇌ 8—15 μ gross und besitzen an der Spitze einen, mit Jod blau färbbaren Quellkörper. Die hyalinen, einzelligen, geraden oder selten wenig gekrümmten, 12—16 ⇌ 3—4 μ grossen Sporen sind in den Asci meist schräg einreihig, selten undeutlich 2- bis 3-reihig gelagert. Zwischen den Asci stehen zahlreiche fädige, hyaline, 1—2 μ dicke Paraphysen, die gegen oben allmählich bis 3 μ dick werden können. (Abb. 4, q).

Bisher sind bereits zwei auf *Linum*-Arten wachsende Pilze beschrieben worden, welche in die Gattung *Pyrenopeziza* Fuck. gestellt wurden, nämlich *Pyrenopeziza lini* (Rostr.) Petr. et Syd. [Synonym: *Laestadia lini* Rostr.] (vgl. Rostrup, 1907, Petrak und Sydow, 1924) und *Pyrenopeziza californica* Sacc. (vgl. Saccardo, 1904).

Pyrenopeziza lini ist gar keine echte *Pyrenopeziza* (Hütter, 1958); wohin diese Art aber richtigerweise gestellt werden muss, kann im Moment noch nicht eindeutig abgeklärt werden. *Pyrenopeziza lini* ist aber sicher von unserm Pilz verschieden. Auch die zweite Art, *Pyrenopeziza californica*, gehört nicht zur Gattung und ist schon von Rehm (1907 b) zu *Pezizella* Fuck. gestellt worden. Da aber diese Gattung sehr heterogene Elemente umfasste, wissen wir noch nicht, wohin *Pyrenopeziza californica* richtigerweise gehört.

Es ist bekannt, dass manche *Pyrenopeziza*-Arten wohl einen Hauptwirt besitzen, auf dem sie gehäuft vorkommen, anderseits aber auch weitere, mit dem Hauptwirt nicht notwendigerweise verwandte Wirtspflanzen besiedeln können. Hütter (1958) hat dafür einige schöne Beispiele gezeigt, nachdem schon Nannfeldt (1932) auf dieses Problem unmissverständlich hingewiesen hatte. Bei jedem Fund einer unbekannten *Pyrenopeziza*art muss demnach geprüft werden, ob es sich tatsächlich um etwas für den betreffenden Wirt typisches oder ob es sich um sogenannte „verirrte" Apothecien handelt. Im vorliegenden Falle ist aber der Pilz auf unserm Material derart häufig vertreten, dass es sich keinesfalls um verirrte Apothecien handeln kann.

9. *Pyrenopeziza sedi* (Rehm) Nannf.

Für einen von G. Winter auf *Sedum atratum* L. zunächst dem Albula Hospiz (Kt. Graubünden) gefundenen Pilz stellte Rehm (1896) die Varietät *Pyrenopeziza nigrificans* Winter var. *sedi* Rehm auf. Er erwähnte dabei aber, dass diese Form der Farbe der Fruchtschicht, der Sporenform und der positiven Jodreaktion der Ascusspitze wegen nur fraglich zu *Pyrenopeziza nigrificans* gehöre, doch ging er später (Rehm, 1912) nicht mehr auf diese Frage ein und stellte Typus wie Varietät zu *Ephelina* Sacc.

Nannfeldt (1932) hat den alpinen Pilz mit einem in Lappland auf *Sedum rhodiola* DC. gefundenen verglichen und vollständige Übereinstimmung festgestellt. Er erkannte dabei, dass diese Art keinesfalls als Varietät zu *Pyrenopeziza nigrificans* Winter betrachtet werden dürfe, sondern vielmehr eine eigene Art darstelle, die er *Pyrenopeziza sedi* (Rehm) Nannf. nannte.

Diesen kleinen, eigenartigen, bis jetzt nur selten gefundenen Pilz haben wir ebenfalls im Val Queyras auf *Sedum roseum* (L.) Scop. [= *Rhodiola rosea* L. = *Sedum rhodiola* DC.], also auf demselben Wirt wie Nannfeldt (1932) angibt, gefunden:

auf abgestorbenen Stengeln von *Sedum roseum* (L.) Scop. — Frankreich, Hautes Alpes, Val Queyras, Echalpe, 28. 6. 1958.

Die schöne Beschreibung und Abbildung der Fruchtkörper von Nannfeldt (1932) möchten wir an dieser Stelle noch durch eine Beschreibung der Fruchtschicht ergänzen:

Die keuligen, 36—52 ⇌ 7—11 μ grossen Asci sind an der Spitze mit einem mit Jod blau färbbaren, von einem Porus durchbohrten Quellkörper versehen und sie enthalten acht, meist schräg einreihig gelagerte, gerade bis wenige gekrümmte, ellipsoidische, selten wenig tropfenförmige, 11—14 ⇌ 3—4 μ grosse, hyaline Sporen. Zwischen den Asci stehen fädige, hyaline, ca. 2 μ breite Paraphysen, die sich gegen die Spitze gelegentlich bis auf 3 μ verbreitern. (Abb. 4, z).

10. *Pyrenopeziza Morthieri* (Fuck.) Rehm.

Pyrenopeziza Morthieri (Fuck.) Rehm ist von *Trollius europaeus* L. beschrieben worden und die seitherigen Funde beschränken sich auf diesen Wirt (Hütter, 1958). Wir haben im Val Queyras aber festgestellt, dass der Wirtskreis doch weiter gezogen werden muss und zum mindesten auch *Anemone*-Arten umfasst. „Verirrte" Apothecien kommen aber auch auf *Geranium pyrenaicum* Burm. vor. Diese Wirte sind durch folgende Funde belegt: (Abb. 4, u)

Anemone alpina L. — Frankreich, Hautes Alpes, Val Queyras, linke Talseite bei Aiguilles, 26. 6. 1958.

Anemone narcissiflora L. — Frankreich, Hautes Alpes, Val Queyras, linke Talseite bei Aiguilles, 26. 6. 1958.

Geranium pyrenaicum Burm. — Frankreich, Hautes Alpes, Val Queyras, linke Talseite bei Aiguilles, 26. 6. 1958.

11. *Pyrenopeziza denigrata* (J. Kze.) Rehm.

Auch für *Pyrenopeziza denigrata* (J. Kze.) Rehm (vgl. Hütter, 1958) haben wir neben *Anthericum*-Arten, als bisher einzig bekannten Wirten, noch eine zweite Pflanze gefunden, auf der dieser Discomycet auftreten kann, nämlich *Asphodelus albus* Miller. Dieser Fund ist folgendermassen belegt: (Abb. 4, r)

auf *Asphodelus albus* Miller. — Frankreich, Hautes Alpes, Col de Var, 30. 6. 1958.

12. *Pyrenopeziza euphrasiae* (Fuck.) J. Kze.

Pyrenopeziza euphrasiae (Fuck.) J. Kze. besitzt im Gegensatz zu manchen andern *Pyrenopeziza*-Arten ziemlich grosse, unten in einen dünnen Schwanz ausgezogene, meist auch septierte Ascosporen; dieses charakteristische Merkmal macht die Art leicht kenntlich. Bis heute sind als Nährpflanzen *Euphrasia*- und *Rhinanthus*-arten bekannt, auf einer *Rhinanthus*art haben wir sie auch im Val Queyras recht häufig gefunden. Doch kommt sie auch — wahrscheinlich als „verirrte" Apothecien — auf *Onobrychis montana* D.C. vor, wie der nachfolgende Fund belegt: (Abb. 4, s)

auf dürren Stengeln von *Onobrychis montana* DC. — Frankreich, Hautes Alpes, Val Queyras, linke Talseite bei Aiguilles, 26. 6. 1958.

13. **Trichodiscus sedi** nov. spec.

Neben der oben erwähnten *Pyrenopeziza sedi* (Rehm) Nannf. fanden wir auf *Sedum roseum* (L.) Scop. — ebenfalls im Val Queyras — einen merkwürdig gebauten Discomyceten, der nach der Wandtextur seiner Apothecien und nach seiner Fruchtschicht als Glied der *Mollisioideae* sensu Nannfeldt (1932) angesprochen werden müsste, daneben aber in seiner Behaarung an die *Hyaloscyphaceae* sensu Nannfeldt, z. B. *Dasyscyphus* S. F. Gray erinnert. Nach der Literatur würde dieser Pilz gut in die von Kirschstein (1924) beschriebene, auf *Lachnella prasina* Quél. basierende Gattung *Trichodiscus* passen. Allein Nannfeldt (1932) hat diese Gattung mit *Lachnum* (Retz) Karst. vereinigt und auch Dennis (1949) ist ihm in seiner monographischen Bearbeitung der britischen Arten der *Hyaloscyphaceae* insofern gefolgt, als er den Gattungstypus von *Trichodiscus* als *Dasyscypha prasina* (Quél.) Schroeter aufführte. (Er hat den Gattungsnamen *Lachnum* (Retz) Karst. durch *Dasyscypha* Fuck. ersetzt).

Unser Pilz auf *Sedum roseum* passte keinenfalls zu *Dasyscyphus* S. F. Gray, aber auch zu keiner andern uns bekannten Discomycetengattung. Wir haben deshalb diesen Fall Herrn Dr. R. W. G. Dennis (Kew, England) unterbreitet; wir möchten ihm auch hier für seine umgehende Antwort herzlich danken. Er schrieb uns darüber: „... I do not today consider *Trichodiscus* should be sunk in *Dasyscyphus*. It seems to be a good genus and one in which your fungus will find a natural place."

Dank dieser eindeutigen Antwort lässt sich auch dieser Discomycet überzeugend einreihen:

Trichodiscus sedi nov. spec.

Matrix: *Sedum roseum* (L.) Scop.

Apothecia cyathi brunnei sunt, 250—350 μ diametro et 200—230 μ altitudine, super substrato sedent; et immersa breve et angusto pediculo, Excipulum base 20—25 μ crassitudine et cellulis polyedricis compositum, parte interiore plus minusve hyalinis, parte exteriore distincte brunneis et 5—7 μ magnitudine. Lateraliter excipulum paulum tenuius et parte inferiore cellulis distincte pseudoparenchymaticis, parte superiore elongatis, quae formant texturam similem texturae pseudoprismaticae. Excipulum parte exteriore asperum cellulis eminentibus et dense saetosum. Saetae 150 μ longitudine, base 2—2,5 μ crassitudine et parietibus mediocriter tenuibus, paucis septis, parte inferiore distincte brunneae, parte superiore clariores et granosae. Pediculum cellulis parvis, polyedricis et gilvis compositum et parte compacta substrato vix immersum, sed in multas hyphas hyalinas dissolvet. Circum pediculum multae hyphae subiculum formant.

Hypothecium tenuissimum et compositum duobus stratis cellulis planis, hyalinis. Multae paraphyses, 1 μ crassitudine ascos numerosos superant. Asci cylindrici poro Jodo coerulescente et 65—75 ⇌ 5—6 μ magnitudine continent octo sporas hyalinas, 1-cellulatas, ellipsoideas aut plus minusve cylindraceas, plerumque rectas, raro leniter curvatas et 10—14 ⇌ 1,5—2 μ magnitudine.

Ad caules siccos *Sedi rosei* (L.) Scop. collectum in Val Queyras (Echalpe), Hautes Alpes, Gallia, 28. 6. 1958.

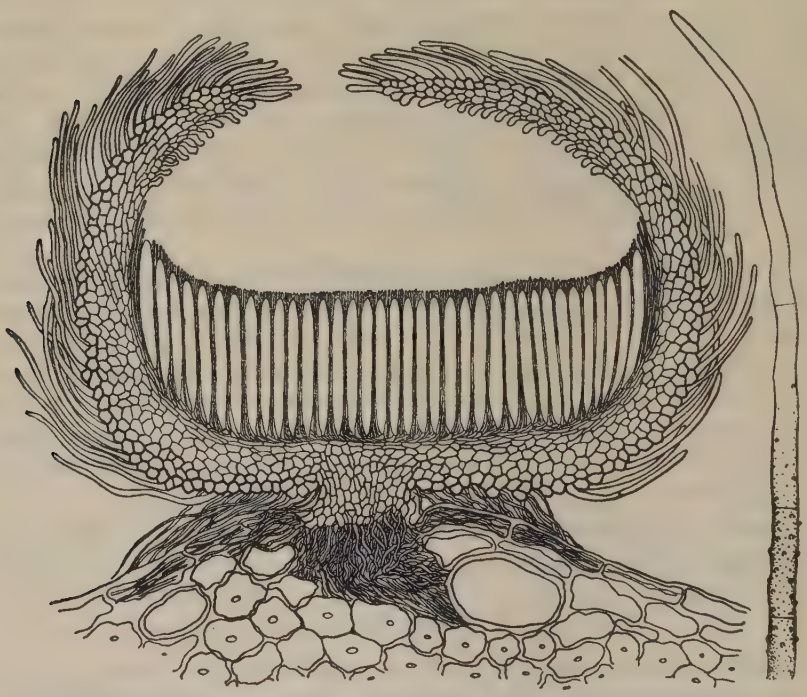

Abbildung 9. Schnitt durch ein Apothecium von *Trichodiscus sedi*. Vergr. 250 ×; rechts: Fruchtkörperhaar, Vergr. 1000 ×.

Die becherförmigen, braunen, 250—350 μ Durchmesser und 200—230 μ Höhe aufweisenden Apothecien sitzen dem Substrat auf und sind nur durch einen schmalen, nicht mehr als 50 μ dicken, kurzen Stiel im Substrat verankert. Das Excipulum ist an der Basis 20—25 μ dick und besteht aus einigen Lagen von polyedrischen, deutlich eckigen, innen zartwandigen und nur schwach braun gefärbten, aussen etwas derbwandigeren, deutlich braunen, 5—7 μ grossen Zellen. Seitlich wird das Excipulum nur wenig dünner und die Zellen sind im untern Teil noch deutlich parenchymatisch angeordnet; etwa auf halber Höhe ordnen sie sich undeutlich in nach aussen, weiter oben in gegen den Margo gerichtete Schichten und werden dabei etwas

verlängert kubisch. Der marginale Teil ist ziemlich stark nach innen gebogen und die Wand löst sich im innern Teil in kurze periphysenartige, hyaline Zellglieder auf. Aussen ist die ganze Wand von vorspringenden Zellen rauh und von einem dichten Filz aus bis 150 μ langen, an der Basis 2—2,5 μ dicken, ziemlich zartwandigen, durch wenige Septen zellige, unten deutlich braune, nach oben allmählich heller werdende, entfernt körnig skulptierte Haare besetzt. Der Stiel besteht aus relativ dünnwandigen und kleinen, bräunlichen, polyedrischen Zellen; er dringt, soweit er aus einem kompakten Gewebe besteht, nur wenig in das Substrat ein, löst sich aber in zahlreiche, hyaline, zartwandige, undeutlich zellige Hyphen auf, welche die Substratzellen teilweise verdrängen und sich ziemlich weit ausbreiten. Rings um den Stiel finden sich ebenfalls zartwandige Hyphen, welche ein ziemlich weit um den Fruchtkörper reichendes hyalines Subiculum bilden.

Das Hypothecium ist nur dünn und besteht aus ein bis zwei Schichten dünnwandiger, hyaliner, stark abgeplatteter Zellen, aus denen die zahlreichen, parallel nebeneinander stehenden Asci und die sie wenig überragenden, ebenfalls sehr zahlreichen, hyalinen, fädigen, ca. 1 μ dicken Paraphysen herauswachsen. Die Asci sind zylinderisch, unten breit und kurz gestielt, am Scheitel sich verjüngend und zuletzt flach abgestutzt, zart- und einfachwandig, mit Jod blau anfärbbarem Apikalapparat versehen und sie messen 65—75 ⇌ 5—6 μ. Die zu je acht meist unregelmässig zweireihig im Ascus liegenden Sporen sind hyalin, einzellig, spindelförmig bis zylinderisch, meist gerade, selten schwach gekrümmt, 10—14 ⇌ 1,5—2 μ gross (Abb. 4, c und d).

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Beiträge zur Kenntnis der Meliolineen.

Von F. Petrak (Wien).

Unter den mir in den letzten drei Jahrzehnten von verschiedenen Mykologen zur Bearbeitung übergebenen Pilzkollektionen war auch eine grössere Anzahl von Meliolineen vorhanden. Ein Teil derselben wurde schon früher bestimmt und veröffentlicht. Durch die Kriegs- und Nachkriegsjahre wurden aber meine diesbezüglichen Studien unterbrochen. Inzwischen hat Dr. C. G. Hansford zahlreiche, auf die Nachprüfung der Originalkollektionen begründete Artikel über Meliolineen veröffentlicht, darin zahlreiche neue Arten beschrieben und unter dem Titel „The Meliolineae" eine Monographie dieser Pilze verfasst, in der mehr als 1800 Arten beschrieben und zum grössten Teile auch abgebildet werden. Der Textband dieser Monographie befindet sich im Druck und wird demnächst als 2. Beiheft der Sydowia erscheinen. Ich konnte diese Monographie als Manuskript bei der Bearbeitung der mir vorliegenden Meliolineen benützen und dabei feststellen, dass dieses ausgezeichnete Werk in Zukunft für alle weiteren Meliolineen-Studien eine überaus wertvolle, unentbehrliche Grundlage bilden wird.

Asteridiella astilbincola Petr. n. spec.

Plagulae epiphyllae, irregulariter dispersae, minutae, etiam sub lente aegre conspicuae, irregulares, indistincte limitatae, 0.3—1 mm, raro usque ad 2 mm diam.; hyphae laxe, raro subdense reticulato-ramosae, plus minusve undulatae, raro rectiusculae, opace atro-brunneae, crasse tunicatae, 6—9 μ latae; hyphopodia capitata laxe disposita, alternata, plus minusve antrorsa, integra, 16—26 μ longa; cellula basali cylindracea, 3—8 μ longa, 5—10 μ lata; cellula apicali ovoidea vel ellipsoidea, raro subglobosa, antice late rotundata vel plus minusve truncata, tunc plus minusve triangulari vel trapezoidea, 10—16 ⇌ 11—15 μ; hyphopodia mucronata ampullacea, 18—21 μ longa, e basi 6—8.5 μ lata paulatim vel abruptiuscule attenuata, opposita vel alternata; perithecia globosa, 140—180 μ, raro usque ad 200 μ diam.; parietis membranacei cellulae irregulariter angulosae, fere opace atro-brunneae, ca. 10—18 μ diam. metientes, 15—20 μ, raro usque ad 30 μ conoideo-prominulae; sporae oblongae vel anguste ellipsoideae, utrinque late rotundatae, vix vel parum attenuatae, 4-septatae, plus

minusve constrictae, pellucide atro-brunneae, 32—37 ⇌ 12—14 ⇌ 10—11 μ*).

Auf *Astilbe philippinensis.* Philippinen; Luzon; Benguet Prov.: Baguio, VI. 1923, leg. M. S. Clemens Nr. 1535.

Die kleinen, zarten auch unter einer scharfen Lupe kaum erkennbaren Rasen tragen meist nur 1—2, selten 3—4 Perithezien.

Asteridiella atricha (Speg.) Hansf. var. *major* Hansf. in Sydowia Beiheft I. p. 95 (1957).

Auf *Eugenia* spec. Philippinen; Luzon; Pangasinan Prov.: Asingan XI. 1923, leg. M. S. Clemens Nr. 3180.

Von allen *Asteridiella*-Arten auf Myrtaceen passt der vorliegende, leider ziemlich schlecht entwickelte Pilz noch am besten zu der oben genannten Varietät der *M. atricha,* weicht aber von deren Beschreibung in mancher Hinsicht nicht unerheblich ab und soll hier kurz beschrieben werden.

Rasen beiderseits, hypophyll jedoch meist nur in der Nähe des Blattrandes, zart, unregelmässig, selten rundlich, bis ca. 2.5 mm gross, durch Zusammenfliessen auch noch grösser werdend. Hyphen mehr oder weniger wellig gekrümmt, 8—9 μ dick. Kopfförmige Hyphopodien abwechselnd 14—21 μ lang, mehr oder weniger vorwärts gerichtet. Basalzelle zylindrisch, 3—6 μ lang; Scheitelzelle zylindrisch, oben breit abgerundet, selten etwas verjüngt, 12—18 ⇌ 7—10 μ. Mukronate Hyphopodien wurden nicht gefunden. Perithezien zerstreut 140—200—230 μ, grobwarzig rauh. Warzen am Grunde bis 60 μ im Durchmesser, teils halbkugelig vorgewölbt, bis ca. 30 μ hoch, teils mehr oder weniger konisch, dann bis 40 μ, selten bis ca. 50 μ vorspringend, in der Mitte oft etwas zusammengezogen und in ein meist etwas fingerförmig gekrümmtes, an der stumpfen Spitze 3.5—10 μ dickes Ende übergehend. Sporen länglich oder gestreckt ellipsoidisch, beidendig breit abgerundet, kaum oder schwach verjüngt, dunkel schwarzbraun, mit 4 Querwänden, an diesen kaum oder schwach eingeschnürt, 43—50 ⇌ 18—21 ⇌ 14—16 μ.

Asteridiella confragosa (Syd.) Hansf. in Sydowia X. p. 47 (1957).

Auf *Trichosanthes quinquangulata.* Philippinen; Mindanao; Davao Prov.: Mt. Apo, VI. 1924, leg. M. S. Clemens Nr. 5208.

Rasen nur epiphyll, klein, 1—2 mm im Durchmesser, ganz unregelmässig oder fast rundlich. Perithezien 130—160 μ im Durchmesser, selten noch etwas grösser, durch flach konvex oder konisch vorspringende Zellen oder kleine unten bis 45 μ Durchmesser er-

*) Dass die Sporen der Meliolineen von zwei Seiten mehr oder weniger zusammengedrückt sind, wird von den Autoren nicht immer berücksichtigt. In den hier mitgeteilten Angaben über die Dimensionen bezieht sich die erste auf die Länge, die zweite auf die Breite in der Flächenansicht und die dritte auf die Breite in der Seitenansicht der Sporen!

reichende Zellkomplexe warzig. Sporen länglich, beidendig breit abgerundet, nicht oder undeutlich verjüngt, 34—43 ⇌ 14—17 ⇌ 12—13 μ.

Asteridiella gymnosporiae (Syd.) Hansf. in Sydowia X. p. 48 (1957).

Auf *Gymnosporia spinosa*. Philippinen; Luzon: Cagayan Prov. I. 1924, leg. M. S. Clemens Nr. 2787 pp.

Diese schöne durch die überaus zahlreichen, kopfigen Hyphopodien ausgezeichnete Art ist am vorliegenden Material von *Dimerium gymnosporiae* (P. Henn.) Syd. befallen. Alle von mir untersuchten Rasen waren steril.

Asteridiella inermis (K. et C.) Hansf. in Sydowia X. p. 48 (1957).

Auf *Buddleia asiatica*. Philippinen; Luzon; Benguet Prov.: Baguio; 16. XII. 1925, leg. M. S. Clemens Nr. 7384.

Rasen nur epiphyll, klein, unregelmässig oder fast rundlich. Hyphen durchscheinend schwarzbraun, 6—9 μ im Durchmesser. Kopfförmige Hyphopodien 18—30 μ lang, mit breit ei- oder birnförmiger, selten fast kugeliger Scheitelzelle. Perithezien im mittleren Teile der Rasen ziemlich dicht gehäuft, 140—270 μ im Durchmesser. Wandzellen kaum oder nur sehr flach konisch bis 12 μ weit vorspringend, unten 20—25 μ breit. Sporen länglich, beidendig kaum oder schwach verjüngt, breit abgerundet, mit 4 Querwänden, kaum oder schwach eingeschnürt, 30—40 ⇌ 14—18 ⇌ 11—13 μ.

Wie mir ein Vergleich mit einer südafrikanischen Kollektion auf *Buddleia salviaefolia* leg. E. M. Doidge Nr. 14127 zeigte, unterscheidet sich der oben angeführte Pilz von den als typisch aufzufassenden Formen durch etwas kleinere Sporen und durch die nur wenig vorspringenden Zellen der Wand.

Asteridiella poracensis Petr. n. spec.

Plagulae amphigenae sed plerumque hypophyllae, laxe dispersae, saepe solitariae, ambitu omnino irregulares raro fere orbiculares, 1—3 mm diam., distincte limitatae, nigrescentes, densae vel subdensae; hyphae opposite et reticulato-ramosae, rectiusculae vel subundulatae, pellucide atro- brunneae, crassiuscule tunicatae, 5—7 μ latae. Hyphopodia capitata numerosa, alternantia, rarissime opposita, antrorsa vel subpatentia, omnino irregularia, 15—20 μ longa; cellula basali cylindracea, 3—4.5 μ longa, 5—6 μ lata; cellula apicali ambitu irregulariter et obtuse angulosa, 2—4-raro indistincte 5-lobata, lobulis e basi 3—6 μ latis usque ad 4 μ altis, antice obtusis vel late rotundatis; hyphopodia mucronata plerumque in centro plagularum evoluta, opposita, raro alternantia, anguste ampullacea, 16—20 ⇌ 4.5—6.5 μ; perithecia dispersa, globosa, 80—130 μ, raro usque ad 150 μ diam.; cellulae parietis membranacei irregulariter angulosae, fere opace

atrocastaneae, ca. 10—20 μ diam., in superficie e basi usque 32 μ lata mammaeformiter vel hemisphaerice 10—15—20 μ prominulae; sporae oblongae vel anguste ellipsoideae, saepe fere cylindraceae, utrinque late rotundatae, vix vel leniter attenuatae, rectae, pellucide atro brunneae, 4-septatae, vix vel leniter constrictae, 30—36 ⇌ 14—17 ⇌ 12—13 μ.

Auf einer weissblühenden Acanthacee; Philippinen; Luzon; Pampanga Prov.: Porac. X. 1923, leg. M. S. Clemens Nr. 4569.

Steht der *A. irregularis* (Stev.) Hansf. gewiss sehr nahe, unterscheidet sich aber davon durch kleinere, relativ gross gelappte Scheitelzellen der Hyphopodien, kleinere Gehäuse, nicht so stark vorspringende Zellen der Membran und kleinere Sporen.

Asteridiella solani McAlpine in Proc. Linn. Soc. N. S. W. XXII. p. 36 (1897).

Auf *Solanum inaequilaterale*. Philippinen; Luzon; Benguet Prov.: Mt. Santo Tomas, 19. II. 1925 leg. M. S. Clemens, Nr. 6410.

Diese Art scheint bisher nur einmal in Neusüdwales gefunden worden zu sein. Von den zahlreichen bisher auf Solanaceen beschriebenen *Asteridiella*-Arten stimmt *A. solani* noch am besten mit dem mir vorliegenden Pilze überein, weshalb ich glaube, dass er damit identifiziert werden muss. Er zeichnet sich durch folgende Merkmale aus:

Rasen beiderseits, locker zerstreut, ca. 1—1.5 mm im Durchmesser, ziemlich dicht. Hyphen mehr oder weniger wellig gekrümmt, 9—11 μ dick, durchscheinend schwarzbraun, dickwandig. Kopfförmige Hyphopodien ziemlich zahlreich, abwechselnd, vorwärts gerichtet, seltener fast horizontal abstehend, 14—21 μ lang. Basalzelle kurz zylindrisch, 2—5 ⇌ 8—10 μ. Scheitelzelle mehr oder weniger kugelig, selten breit eiförmig oder ellipsoidisch, 12—15 ⇌ 11—17 μ oder ca. 11—14 μ im Durchmesser. Mukronate Hyphopodien meist gegenständig, 14—20 ⇌ 6—9, zuweilen bis 24 μ lang, dann mit 12—14 μ langem Hals. Perithezien 120—200 μ im Durchmesser. Zellen der Oberfläche breit kegelförmig, selten fast halbkugelig, aus ca. 30—35 μ breiter Basis bis ca. 35 μ vorragend. Sporen länglich, beidendig breit abgerundet, 4-zellig, an den Querwänden kaum oder sehr schwach eingeschnürt, 32—38 ⇌ 14—18 ⇌ 10—13 μ.

In den *Asteridiella*-Rasen kommt zuweilen auch eine Asterinee mit schiefergrauen, wellig gekrümmten, 4—5 μ breiten Hyphen und in der Form ganz unregelmässigen Fruchtgehäusen mit radiärer Deckschicht vor, die eine mächtig entwickelte, paraphysoide, schön hell tintenblau gefärbte Schleimmasse enthalten, der die unreifen Aszi eingebettet sind.

Asteridiella subglabroides Hansf. in Sydowia X. p. 60 (1957).

Auf einer Anonacee. Philippinen; Mindanao; Davao Prov.: Mt. Apo, VI. 1924, leg. M. S. Clemens, Nr. 5262.

Die Typuskollektion dieser Art wurde von Stevens auf einer Anonacee in British Guiana gesammelt. Das mir vorliegende, gut entwickelte, leider ziemlich dürftige Exemplar, das ich mit *M. subglabroides* identifizieren muss, weicht nur durch folgende Merkmale ab: Rasen nur hypophyll, rundlich, bis ca. 5 mm im Durchmesser. Kopfförmige Hyphopodien spärlich, mit eiförmiger oder ellipsoidischer, 9—15 μ langer oben abgerundeter, oft auch breit abgestutzter, nicht gelappter Scheitelzelle. Perithezien 100—140 μ; Sporen länglich, beidendig schwach verjüngt, breit abgerundet, an den 4 Querwänden schwach eingeschnürt, schwarzbraun, 34—40 ⇌ 14—17 ⇌ 10—12.5 μ.

Asteridiella tarlacensis Petr. n. spec.

Plagulae amphigenae, irregulariter et late dispersae, densae, ambitu omnino irregulares, raro fere orbiculares, sat bene limitatae, 0.5—2 mm diam., interdum aggregatae, tunc plus minusve confluentes et majores; hyphae laxe opposite et dense reticulato-ramosae, rectiusculae vel parum undulatae, 6—10 μ latae, crasse tunicatae, opace atro-brunneae; hyphopodia capitata alternata, rarissime opposita, valde antrorsa, recta, raro curvula, 21—30 μ longa; cellula basali cylindracea, vel truncato-obconica, 6—13 ⇌ 6—11; cellula apicali ovoidea, ellipsoidea, raro fere cylindracea vel subglobosa, integra, antice late rotundata, raro subtruncata, interdum plus minusve irregulari et tunc indistincte 1—2-lobulata, 12—20⇌10—13; hyphopodia mucronata pauca, plerumque opposita, ampullacea, e basi 6—9 μ lata paulatim vel abruptiuscule attenuata, antrorsa vel plus minusve recurvata, 16—21 μ longa; perithecia in centro plagularum laxe vel subdense dispersa, globosa, 160—200 μ rarssime usque ad 220 μ diam.; parietis membranaceae cellulae irregulariter angulosae, opace atro-brunneae, 8—15 μ, raro usque ad 20 μ diam., metientes, vix vel usque ad 10 μ convexo-prominulae; sporae oblongae anguste ellipsoideae, utrinque late rotundatae, vix vel parum attenuatae, rectae, pellucide atro-brunneae, 4-septatae, ad septa parum sed plerumque distincte constrictae, 38—44 ⇌ 14—17 ⇌ 12—13 μ.

Auf *Plectronia monstrosa*. Philippinen; Luzon; Tarlac Prov., near Pura, XI. 1923, leg. M. S. Clemens, Nr. 2621.

Obwohl zahlreiches Material vorliegt, sind Perithezien nur noch äusserst selten anzutreffen, weil sie sich sehr leicht ablösen und zum grössten Teile schon abgefallen sind. Dieser Pilz zeichnet sich vor allem durch das sehr dichte, mit vielen Hyphopodien besetzte Myzel aus.

Asteridiella tetrastigmatis Petr. n. spec.

Plagulae amphigenae sed plerumque epiphyllae, irregulariter dispersae, ambitu omnino irregulares, raro fere orbiculares, indistincte limitatae, subdensae, nigrescentes, 1—3 mm diam., raro et plerumque

confluendo tantum paulo majores; hyphae opposite et laxe reticulato-ramosae, rectiusculae vel plus minusve undulatae, pellucide atro-olivaceae, crasse tunicatae, 5—7 μ latae; hyphopodia capitata subnumerosa, alternantia, rarissime opposita, antrorsa vel subpatentia, recta vel curvula, 22—33 μ longa; cellula basali cylindracea vel truncato-obconica, 5—13 μ, raro ad 16 μ longa, 5—8 μ lata; cellula apicali quoad formam variabili, ovoidea, late ellipsoidea vel subglobosa, saepe obtuse angulosa, interdum minute 2—4-lobulata, 14—21 ⇌ 13—17—20 μ; hyphopodia mucronata pauca, irregulariter distributa. alternantia vel opposita, ampullacea vel fere conoidea, recta vel parum recurvata, 14—22 ⇌ 5—6.5 μ, abruptiuscule vel paulatim attenuata; perithecia laxe dispersa, globosa, 110—170 μ diam., verruculis mammaeformibus vel late conoideis, raro fere hemiglobosis, ad basin usque ad 32 μ latis, 10—22 μ altis praedita; parietis cellulae irregulariter angulosae, fere opace atro-brunneae, ca. 7—12 μ diam., raro paulo majores; sporae oblongae vel anguste ellipsoideae, utrinque late rotundatae vel lenissime attenuatae, rectae, pellucide atro-olivaceae, 4-septatae, ad septa leniter constrictae, 38—43 ⇌ 15—18 ⇌ 13—14 μ.

Auf *Tetrastigma Harmandii.* Philippinen; Luzon; Tarlac Prov.: La Paz, XII. 1924, leg. M. S. Clemens.

Von *A. perspicua* (Cif.) Hansf. und *A. leeicola* Hansf., den beiden bisher auf Vitaceen bekannt gewordenen Arten der Gattung ist *A. tetrastigmatis* durch die grossen, sehr unregelmässigen, oft stumpfeckigen oder undeutlich 2—4-lappigen Scheitelzellen der Hyphopodien und etwas grössere Sporen leicht zu unterscheiden.

Asteridiella tremae (Speg.) Hansf. in Sydowia X. p. 50 (1957).

Auf *Pipturus* spec. oder*Trema orientalis.* Philippinen; Mindanao; Davao Prov.: Mt. Apo, VI. 1924, leg. M. S. Clemens, Nr. 5308.

Rasen beiderseits, sehr zart, ganz unregelmässig, oft den Nerven folgend, dann fast dentritisch verzweigt, klein, ganz unscharf begrenzt; Hyphen locker verzweigt, kastanienbraun, mehr oder weniger wellig gekrümmt, 5—7 μ breit; kopfförmige Hyphopodien abwechselnd, stark vorwärts gerichtet, 15—26 μ lang; Scheitelzellen eiförmig oder breit ellipsoidisch, oft mehr oder weniger unregelmässig, vorne zuweilen flach 2—3-lappig, 12—16 ⇌ 10—15 μ. Perithezien 110—170 μ gross. Sporen länglich ellipsoidisch, beidendig breit abgerundet, kaum oder schwach verjüngt, mit 4 Querwänden, kaum eingeschnürt, 33—44 ⇌ 16—19 ⇌ 12—14 μ.

Asteridiella vilis (Syd.) Hansf. in Sydowia X. p. 51 (1957).

Auf *Callicarpa* spec. Philippinen; Luzon; Benguet Prov.; Mt. Santo Tomas, 19. II. 1925, leg. M. S. Clemens, Nr. 5881. — Auf *C. formosana.* Luzon; Tarlac Prov.: Paniqui, I. 1925, leg. M. S. Clemens, Nr. 6557. — Auf *C. Blancoi.* Luzon; Zambales Prov.: Olon-

gapo, III. 1924, leg. M. S. Clemens, Nr. 2471. — *C. cana.* Luzon; Tarlac Prov.: Gerona, I. 1925, leg. M. S. Clemens, Nr. 6329.

Hyphen ziemlich dicht netzartig verzweigt, mehr oder weniger stark gekrümmt, 5—7.5 μ breit, durchscheinend kastanienbraun. Kopfige Hyphopodien abwechselnd, fast senkrecht abstehend oder etwas vorwärts gerichtet, mit kurz zylindrischer, 4—10 μ langer, 5—6.5 μ breiter Basalzelle und ellipsoidischer, ei- oder birnförmiger, selten fast kugeliger, 11—17 ⇌ 10—13 μ breiter Scheitelzelle. Perithezien 130—170 μ im Durchmesser. Zellen der Membran kaum oder nur sehr breit und flach konvex vorgewölbt. Sporen länglich oder schmal ellipsoidisch, beidendig sehr breit abgerundet, kaum oder schwach verjüngt, dunkel kastanienbraun, mit 4 Querwänden, kaum oder schwach eingeschnürt, 40—46 ⇌ 18—20 ⇌ 15—16 μ. Weicht von den in der Literatur vorhandenen Beschreibungen durch nicht unwesentlich grössere, vor allem breitere Sporen ab.

Die beiden Kollektionen auf *Callicarpa formosana* und *C. Blancoi* haben kleinere, meist 100—140 μ grosse Perithezien und kleinere bis 40 μ, nur vereinzelt bis ca. 43 μ lange Sporen.

Asteridiella wickstroemiae Petr. n. spec.

Plagulae epiphyllae, rarissime hypophyllae, irregulariter dispersae, ambitu irregulares, raro fere orbiculares, sat distincte limitatae, laxiusculae vel subdensae, 1—2 mm diam., raro et plerumque confluendo tantum paulo majores; hyphae opposite ramosae, laxe vel subdense reticulatae, rectiusculae vel lenissime undulatae, crasse tunicatae, fere opace atro-brunneae, 6—8 μ crassae; hyphopodia capitata alternata plus minusve antrorsa, recta, 14—23 μ longa; cellula basali cylindracea vel obconica, 3—5 ⇌ 5—6.5 μ; cellula apicali ovoidea vel late ellipsoidea, raro fere globosa, antice latissime rotundata, raro fere truncata, integra vel rarissime indistincte sinuosa vel sublobulata 11—15 ⇌ 10—14 μ; hyphopodia mucronata opposita vel alternata, plerumque in plagulae centro tantum evoluta, anguste conica, raro subampullacea, e basi paulatim attenuata, antice obtusa vel truncata, 16—20 ⇌ 5—6.5 μ; perithecia laxe dispersa, globosa, 100—150 μ diam.; parietis membranacei cellulae irregulariter angulosae, obscure atro-brunneae, 8—16 μ raro usque ad 20 μ diam., in superficie usque ad 10 μ prominulae; sporae oblongae vel anguste ellipsoideae, utrinque late rotundatae, vix vel lenissime attenuatae, rectae, atro-brunneae, 4-septatae, ad septa vix vel lenissime constrictae, 36—40 ⇌ 14—16 ⇌ 12—13.5 μ.

Auf *Wickstroemia Meyeniana.* Philippinen; Luzon; Benguet Prov.: Baguio. 24.—31. XII. 1925, leg. M. S. Clemens, Nr. 7381.

Der Pilz ist auf dem spärlich vorliegenden Material noch sehr jung. Die spärlich vorhandenen Perithezien enthalten meist nur unreife Aszi ohne Sporen.

Irenopsis Molleriana (Wint.) Stev. in Annal. Mycol. XXV. p. 437 (1927).

Auf *Hibiscus tiliaceus*. Philippinen; Luzon; Isabella Prov.: San Mariano, IV. 1926, leg. M. S. Clemens, Nr. 7486.

Rasen unregelmässig oder rundlich, bis ca. 5 mm im Durchmesser, nur epiphyll, zart. Hyphen netzartig verzweigt meist wellig oder eckig hin und her gekrümmt, 5—8 μ breit, durchscheinend schwarzbraun. Kopfförmige Hyphopodien ziemlich entfernt stehend mit zylindrischer, 3—5 μ langer, 5—6.5 μ breiter Basalzelle und meist sehr unregelmässiger, stumpf dreieckiger oder trapezoidischer, selten fast rundlicher oder elliptischer, bis ca. 15 μ breiter Scheitelzelle, die von oben nach unten meist deutlich zusammengepresst und dann etwas breiter als hoch ist; vorne ist sie zuweilen ausgerandet oder undeutlich gelappt. Perithezien locker zerstreut, 120—180 μ im Durchmesser, mit einigen steifen, geraden oder nur schwach wellig gekrümmten, bis ca. 80 μ langen, meist dreizelligen, unten ca. 7.5 μ breiten, schwarzbraunen, nach oben allmählich verjüngten, an der stumpf abgerundeten Spitze mehr oder weniger heller gefärbten Borsten besetzt. Zellen der Wand unregelmässig eckig, 8—15 μ gross, an der Oberfläche ziemlich stark konvex oder fast konisch vorspringend. Sporen länglich, beidendig breit abgerundet, gerade, mit 4 Querwänden, an diesen schwach eingeschnürt, schwarzbraun, 32—38 ⇌ 14—16 ⇌ 10—12.5 μ.

Meliola abraensis Petr. n. spec.

Plagulae amphigenae sed plerumque hypophyllae, irregulariter dispersae, nigrescentes, densae, subvelutinae, ambitu irregulares vel fere orbiculares, 1—3 mm diam., saepe aggregatae, plus minusve confluentes et majores; hyphae opposite et reticulato-ramosae, rectae vel curvulae, crasse tunicatae, pellucide atro-brunneae, 9—10 μ latae; hyphopodia capitata alternantia, raro opposita, subnumerosa, antrorsa, raro subpatentia, 26—30 μ, raro usque ad 33 μ longa; cellula basali breviter cylindracea, 6—12 ⇌ 9—13; cellula apicali cylindracea vel anguste piriformi, antice late rotundata, plus minusve curvula, raro recta, integra, raro indistincte angulosa vel 1-lobulata, 20—26 ⇌ 10—14 μ; hyphopodia mucronata rara, plerumque opposita, anguste conoidea vel subampullacea, 15—20 ⇌ 7—10 μ, apicem versus paulatim, raro abruptiuscule attenuata; setae mycelicae paucae vel subnumerosae, e basi plus minusve geniculata rectae vel breviter arcuatae, opace atro-brunneae, 200—350 ⇌ 10—12.5, nunc simplices, apicem versus vix vel parum attenuatae, obtusae, nunc 2—4-dendatae, dentibus 3—6 ⇌ 2.5—4 μ obtusiusculis vel 1—2-dichotome furcatis, ramulis primariis usque ad 23 μ longis, plus minusve saepe fere horizontaliter patentibus, 4—6 μ latis, ramulis secundariis ad dentes minutos, plus minusve divergentes reductis; perithecia laxe dispersa,

globosa, 120—230 μ diam.; parietis membranacei cellulae irregulariter angulosae, fere opace atro-brunneae, 6—12—15 μ diam., in superficie perithecii vix vel lenissime prominulae; sporae oblongae vel elongato-ellipsoideae, utrinque late rotundatae, vix vel leniter attenuatae, rectae, pellucide atro-brunneae, 4-septatae, plus minusve constrictae, 40—50 ⇌ 20—24 ⇌ 14—17 μ.

Auf *Semecarpus* (? *philippinensis*). Philippinen; Luzon; Benguet Prov.: Abra, II. 1923, leg. M. S. Clemens, Nr. 68.

Dieser Pilz ist von *M. semecarpi* Syd. und *M. semecarpicola* Hansf. schon durch die teilweise gezähnten oder dichotom kurzästigen Borsten und wesentlich grössere Sporen leicht zu unterscheiden. Die Scheitelzelle der Hyphopodien ist meist vor-, seltener rückwärts gekrümmt, oft fast rechtwinkelig geknickt und liegt dann mit einer Seite der Traghyphe eng an.

Meliola acaciarum Speg. in Anal. Soc. Cient. Argentina XCIII. p. 193 (1922).

Auf *Acacia philippinarum,* Philippinen; Luzon: Zambales Prov.: Olongapo, III. 1924, leg. M. S. Clemens, Nr. 2429.

Rasen beiderseits, klein, meist ganz vereinzelt, sehr zart, kaum sichtbar. Hyphen sehr locker verzweigt, meist schwach wellig gekrümmt, 6—7 μ dick. Kopfförmige Hyphopodien abwechselnd, mit 3—6 μ langer, zylindrischer Basalzelle und eiförmiger oder ellipsoidischer, 9—12 ⇌ 7—10 μ grosser Scheitelzelle. Mukronate Hyphopodien sehr spärlich, 15—20 ⇌ 5—7 μ. Myzelborsten ziemlich gerade oder schwach bogig gekrümmt, fast opak schwarzbraun, einfach, stumpf abgerundet oder abgestutzt, 200—330 μ lang, 7—9 μ breit. Perithezien 150—190 μ gross, ganz vereinzelt, länglich, beidendig breit abgerundet, kaum oder schwach verjüngt, schwarzbraun, 30—36 ⇌ 12—16 ⇌ 10—12.

Dieser Pilz ist auf dem reichlich vorhandenen Material nur sehr spärlich vorhanden und schlecht entwickelt. Er stimmt aber mit der Beschreibung von *M. acaciarum* gut überein und wurde deshalb zu dieser Art gestellt.

Meliola aceris Yamam. Trans. Nat. Hist. Soc. Formosa, XXX. p. 416 (1940).

Auf *Acer niveum.* Philippinen; Mindanao; Davao Prov.: Mt. Apo, VI. 1924, leg. M. S. Clemens, Nr. 5685.

Weicht von der Beschreibung durch die niemals gezähnten Borsten ab, dürfte aber wohl kaum verschieden sein, weil dieses Merkmal, wie ich gefunden habe, sehr veränderlich sein kann. Nach der mir vorliegenden Kollektion teile ich hier eine kurze Beschreibung mit:

Rasen hypophyll, mehr oder weniger rundlich, unscharf begrenzt, oft genähert, dann mehr oder weniger zusammenfliessend und grössere Teile der Blattfläche überziehend, zuerst locker, später

dichter werdend, schwarz. Hyphen schwarzbraun meist etwas wellig gekrümmt, dickwandig, 6—9 μ breit. Kopfförmige Hyphopodien abwechselnd, stark vorwärts gerichtet, mit kurz zylindrischer, 5—6 μ langer Basalzelle und ellipsoidischer, zuweilen fast kugeliger, 10—16 ⇌ 10—12 μ grosser Scheitelzelle. Mukronate Hyphopodien spärlich, meist gegenständig, aus ca. 6.5 μ breiter Basis ungefähr von der Mitte an verjüngt. Myzelborsten ziemlich zahlreich, aus knieförmig gekrümmter Basis sehr allmählich verjüngt, opak schwarzbraun, sich kaum oder nur an der Spitze etwas heller färbend, ca. 8—12 μ dick, gerade oder etwas bogig, selten unregelmässig gekrümmt, stumpf zugespitzt. Perithezien 140—180—200 μ gross. Sporen länglich zylindrisch, beidendig breit abgerundet, kaum oder undeutlich verjüngt, 34—43 ⇌ 15—17 ⇌ 10—12 μ schwarzbraun, mit 4 Querwänden, an diesen kaum oder schwach eingeschnürt.

Meliola acristae Hansf. in Sydowia Beiheft I. p. 99 (1957).

Auf *Livistona* spec. Philippinen; Luzon; Pangasinan Prov.: Rosales and Vicinity, 1.—14. II. 1925, leg. M. S. Clemens, Nr. 5932.

Dieser Pilz, von dem mir zahlreiches, leider nicht gut entwickeltes Material vorliegt, ist von *M. livistonae* Yates — nach der Be-Beschreibung zu urteilen — sicher verschieden. Er gehört dem engeren Formenkreise der *M. acristae* an, weicht aber sowohl von der typischen Form dieser Art als auch von allen Varietäten ab, die Hansford von ihr beschrieben hat. Deshalb lasse ich von diesem Pilze hier eine kurze Beschreibung folgen, verzichte aber darauf, ihm einen besonderen Namen zu geben.

Rasen beiderseits, hypophyll zahlreicher, unregelmässig oder fast rundlich, 2—5 mm im Durchmesser, selten noch etwas grösser, ziemlich dicht. Hyphen teils gegenständig, teils netzig verzweigt, durchscheinend schwarzbraun, ziemlich dickwandig, die Seitenäste meist etwas wellig gekrümmt, 5—7 μ breit. Kopfförmige Hyphopodien nicht besonders zahlreich, abwechselnd, bis ca. 36 μ lang, meist vorwärts gerichtet, selten fast horizontal abstehend, vereinzelt auch nach rückwärts gekrümmt. Basalzelle zylindrisch oder gestutzt und verkehrt konisch, ca. 9—18 ⇌ 6—10 μ. Scheitelzelle kurz zylindrisch, gestreckt eiförmig oder ellipsoidisch, ganzrandig, 14—20 ⇌ 10—14 μ. Myzellborsten zahlreich, dicht stehend, 100—200 ⇌ 7—10 μ, opak schwarzbraun oben 1—3-mal dichotom verzweigt, die Äste erster Ordnung mehr oder weniger horizontal abstehend, oft etwas zurückgekrümmt, ca. 15—80 ⇌ 6.5—8 μ, die Äste zweiter Ordnung aufrecht abstehend, 5—30 ⇌ 5—6 μ, die Ästchen dritter Ordnung mehr oder weniger spreizend, 3—15 ⇌ 3—4.5 μ. Die meisten Borsten sind nur ein- oder zweimal dichotom verzweigt. Dann sind die Enden der Ästchen meist mit 1—3—4 sehr kleinen, hell gefärbten, papillenförmigen oder stumpf konischen, 2—6 ⇌ 1.5—3 μ grossen Zähnchen

versehen. Perithezien 130—180 μ. Sporen länglich oder schmal ellipsoidisch, beidendig breit abgerundet, mit 4 Querwänden, kaum oder schwach eingeschnürt, dunkel schwarzbraun, 38—44 ⇌ 14—16 ⇌ 12—13 μ.

Meliola amboinensis Syd. in Philipp. Journ. Sci. XXI. p. 133 (1922).

Auf *Aganosma acuminata*. Philippinen; Luzon, Cagayan Prov., I. 1924, leg. M. S. Clemens, Nr. 4745. — Prov. Rizal; Taytay, VIII. 1923, Nr. 4472. — Prov. Pangasinan: Rosales and Vicinity, 1.—14. II. 1925, Nr. 5953.

Diese Pilze stimmen untereinander und mit der Beschreibung nicht völlig überein. Deshalb sollen sie hier kurz beschrieben und besprochen werden. Bei Nr. 4745 sind die Borsten bis 500 μ lang, 6—7.5 μ breit, die Perithezien sind 120—170 μ, die Sporen 30—36 ⇌ 14—17 ⇌ 10—12 μ gross. — Die Myzelhyphen von 4472 sind 5—7 μ breit. Kopfförmige Hyphopodien 15—21—23 μ lang, Myzelborsten bis 600 ⇌ 5.5—10 μ gross. Die Grösse der Perithezien schwankt zwischen 130 und 210 μ; Sporen 26—33⇌ 13.5—15 ⇌ 9—10 μ. — Die Kollektion Nr. 5953 hat die längsten Borsten, die zuweilen bis 800 μ lang werden können. Die kopfförmigen Hyphopodien sind 13—20 μ lang, die Perithezien 130—180 μ gross. Sporen etwas grösser, 32—36 μ lang, 14—17 ⇌ 9—11 μ breit.

Meliola angiopteridis Hansf. in Reinwardtia III. p. 91 (1954).

Auf *Angiopteris* Mindanao; Davao Prov.: Todaya, Mt. Apo via Sibulan, 17. V. 1924, leg. M. S. Clemens, Nr. 5394.

Rasen nur hypophyll, sich oft ganz vereinzelt entwickelnd, im Umriss rundliche oder elliptische, 3.5—7 mm grosse, kohlschwarze, zuweilen auch etwas unregelmässige, meist ziemlich scharf begrenzte, epiphyll schmutzig graubraune, unscharf begrenzte Verfärbungen verursachende Überzüge bildend, die aus gegenständig und unregelmässig netzartig verzweigten, meist etwas wellig gekrümmten, fast opak schwarzbraunen, ziemlich dickwandigen und kurzgliederigen, 5—7 μ breiten Hyphen bestehen. Kopfförmige Hyphopodien meist nur auf einer Seite der Hyphen stehend, seltener abwechselnd, mit kurz zylindrischer, meist ca. 3—5 μ, seltener bis 7 μ langer, 4—6 μ breiter Basalzelle und breit eiförmiger oder fast kugeliger, zuweilen etwas stumpfeckiger oder einseitig eingedrückter, dann mehr oder weniger unregelmässiger, 8—12 μ langer und ungefähr gleich breiter Scheitelzelle. Mukronate Hyphopodien nur stellenweise, dann aber ziemlich zahlreich, aus zylindrischer, ca. 7.5 μ hoher, 5—6.5 μ breiter Basis, plötzlich stark verjüngt oder zusammengezogen und in einen mehr oder weniger vorwärts gerichteten, oft etwas fingerförmig gekrümmten, bis ca. 10 μ langen, ca. 3 μ dicken, an der Spitze abgestutzten, halsartigen Teil verjüngt. Myzelborsten zahl-

reich und dicht stehend, ziemlich gerade oder nur schwach bogig gekrümmt, fast opak schwarzbraun, unten 7—9 μ breit, zuerst kaum oder wenig, weiter oben etwas stärker verjüngt, stumpf zugespitzt, 150—400 μ, selten bis ca. 550 μ lang. Perithezien zerstreut, zwischen den Borsten nistend, rundlich, 130—200 μ im Durchmesser, durch die flach konvex oder sehr breit und stumpf konisch vorspringenden Zellen der Wand kleinwarzig. Wand häutig, später brüchig werdend, aus sehr unregelmässig eckigen, fast opak schwarzbraunen, 8—15 μ grossen Zellen bestehend. Sporen länglich, beidendig breit abgerundet, kaum oder sehr schwach verjüngt, gerade, mit 4, sehr selten mit 3 Querwänden, meist schwach eingeschnürt, schwarzbraun, 30—36 ⇌ 10—13 ⇌ 9—10 μ.

Meliola argentina Speg. in Anal. Soc. Cient. Argentina IX. p. 177, (1880).

Auf *Gahnia Clarkei*. Kangaroo Valley, Australien, 30. VIII. 1955, leg. E. Gauba.

Rasen beiderseits, meist hypophyll und weit ausgebreitet, kohlschwarz. Myzelborsten gerade oder etwas bogig gekrümmt, stumpf zugespitzt, seltener abgestutzt, opak schwarzbraun, bis 900 μ lang, unten 10—14 μ breit. Perithezien mehr oder weniger dicht gehäuft, 180—230 μ gross, kahl oder mit einigen, bis ca. 100 μ langen, oben oft etwas zurückgekrümmten Borsten besetzt. Sporen länglich zylindrisch, beidendig breit abgerundet, kaum verjüngt, schwarzbraun, gerade, zuweilen ungleichseitig oder etwas gekrümmt, mit 4 Querwänden, kaum oder schwach verjüngt, 43—54 ⇌ 12—14 ⇌ 11—13 μ.

Die Rasen sind oft von einer Dimeriee befallen und dann mehr oder weniger schlecht entwickelt.

Meliola arundinis Pat. in Journ. Bot. 1897, p. 348.

Auf einer Graminee, wahrscheinlich *Phragmites* oder Bambus. Sumatra: Aroegemoeb, Serdang, V. 1927, leg. K. B. Boedijn.

Rasen unregelmässig zerstreut, epiphyll sehr selten und auch meist schlecht entwickelt auf der Blattunterseite, sehr dicht, kohlschwarz. Hyphen durchscheinend schwarzbraun, sehr dicht netzig verzweigt, 7—9 μ breit. Kopfförmige Hyphopodien zahlreich, mit 6—12—15 μ langer Basalzelle und eiförmiger oder breit elliptischer, selten fast kugeliger, oft etwas unregelmässiger, 11—15 ⇌ 10—16 μ grosser Scheitelzelle, Borsten sehr zahlreich, 130—200 μ lang, 11—15 μ breit, oben meist zweimal dichotom geteilt. Äste erster Ordnung meist horizontal spreizend, ca. 15—23 μ lang; Äste 2. Ordnung etwas bogig gekrümmt, stumpf zugespitzt, 15—36 μ lang, 5—6.5 μ breit, an der Spitze zuweilen mit einem, seltener mit zwei kleinen Zähnchen versehen. Perithezien 130—210 μ gross. Sporen länglich oder fast zylindrisch, beidendig breit abgerundet, kaum verjüngt, durchschei-

nend schwarzbraun, mit 4 Querwänden, meist etwas eingeschnürt, 45—53 ⇌ 17—19 ⇌ 13—15 μ.

Meliola banahaoensis. Yates in Philipp. Journ. Sci. C. Botany, XIII. p. 364 (1918).

Auf einer *Meliaceae*; ? *Dysoxylon* spec. Philippinen; Luzon; Bataan Prov.: Orion, V. 1923, leg. M. S. Clemens, Nr. 856. — Auf derselben oder einer sehr ähnlichen Nährpflanze. Luzon; Nueva Viscaya Prov.: Bambang, leg. M. S. Clemens, Nr. 3457.

Diese beiden Kollektionen stimmen untereinander und mit einem mir vorliegenden Originalexemplare sehr gut überein. In bezug auf den Bau der Myzelrasen sind jedoch zwei voneinander nicht unwesentlich abweichende, aber durch zahlreiche Übergänge miteinander verbundene Formen vorhanden, die hier beschrieben werden sollen.

Rasen auf beiden Blattseiten; hypophyll, meist ganz vereinzelt, sehr unregelmässig und locker zerstreut, rundlich, oft ziemlich regelmässig rundlich oder breit elliptisch, bisweilen etwas unregelmässig, ziemlich scharf begrenzt, am Rande oft etwas buchtig oder gelappt, 3—8 mm im Durchmesser, bisweilen genähert, dann zusammenfliessend, grösser und ganz unregelmässig werdend. Hyphen teils gegenständig, teils unregelmässig verzweigt, weiter gegen den Rand hin oft parallel nebeneinander verlaufend, mit den zahlreichen Hyphopodien kleinere oder grössere, fast lückenlose Häutchen bildend, gerade oder nur schwach wellig gekrümmt, ziemlich dickwandig, durchscheinend kastanienbraun, 5—7.5 μ breit, am Rande unregelmässig ausstrahlend. In den Myzelrasen der Oberseite stehen die Hyphen viel dichter beisammen und bilden aussen ein schmales, nicht mit Borsten besetztes, radiär gebautes, am Rande scharf begrenztes Häutchen. Kopfförmige Hyphopodien zahlreich, abwechselnd, sehr selten gegenständig, mit kurz zylindrischer oder gestutzt und verkehrt konischer, meist stark vorwärts gerichteter, 4—10 μ langer, 7—10 μ breiter Basalzelle und eiförmiger oder breit ellipsoidischer, selten fast kugeliger oder etwas unregelmässiger, 10—15 ⇌ 10—13 μ grosser Scheitelzelle. Mukronate Hyphopodien wurden nicht gefunden. Was als solche beschrieben wurde, wird wohl als kurze Seitenäste der Hyphen aufzufassen sein. Myzelborsten auf den Rasen der Unterseite in der Mitte meist sehr zahlreich, weiter aussen lockerer stehend, gerade oder etwas bogig gekrümmt, 200—300 μ, selten bis 350 μ lang, 8—10 μ breit, fast opak schwarzbraun, teils mehr oder weniger verjüngt und zugespitzt, teils nicht oder nur undeutlich verjüngt, dann meist mit 2—3, seltener mit 4 ungleich langen, mehr oder weniger spreizenden, stumpf zugespitzten, 3—14 μ langen Zähnchen versehen. Epiphyll sind die Borsten weniger zahlreich; die meisten von ihnen sind aber an der Spitze gezähnt. Perithezien locker oder ziemlich dicht zerstreut, kugelig, 160—250 μ im Durchmesser. Zellen der Wand rundlich eckig, 7—13 μ gross, aussen

kaum oder nur schwach konvex vorspringend. Sporen länglich oder gestreckt ellipsoidisch, beidendig breit abgerundet, kaum oder schwach verjüngt, gerade, dunkel schwarzbraun, an den vier Querwänden mehr oder weniger eingeschnürt, 42—50 ⇌ 19—21 ⇌ 11—15 µ.

Meliola bataanensis Syd. in Annal. Mycol. XII. p. 551 (1914).

Auf *Derris scandens*. Philippinen; Luzon; Prov. Tarlac: La Paz, XII. 1924, leg. M. S. Clemens, Nr. 6420.

Rasen unregelmässig oder rundlich, sehr zart, graubraun, 2—10 mm im Durchmesser, oft zusammenfliessend und grösser werdend. Hyphen sehr locker gegenständig und netzartig verzweigt, 5—7 µ dick. Kopfförmige Hyphopodien abwechselnd, mit 3—6 µ langer Basalzelle und eiförmiger oder ellipsoidischer, 8—13 ⇌ 7—10.5 µ grosser Scheitelzelle. Myzelborsten spärlich, stumpf zugespitzt, 250—450—500 µ lang, 6—9 µ dick. Perithezien sehr locker zerstreut, meist ganz vereinzelt, so wie die Borsten sehr leicht abfallend, 100—150 µ, selten noch etwas grösser. Sporen länglich, beidendig kaum verjüngt, breit abgerundet, mit 4 Querwänden, an diesen meist schwach eingeschnürt, 32—38 ⇌ 13—15 ⇌ 10—12 µ.

Meliola batangasensis Hansf. in Sydowia, Beiheft I. p. 100, (1957).

Auf *Homalium* spec. Philippinen; Luzon; Pampanga Prov: Mt. Arayat, III. 1923, leg. M. S. Clemens, Nr. 663.

Rasen hypophyll, sehr zerstreut, oft ganz vereinzelt, im Umriss rundlich, aber meist mehr oder weniger unregelmässig, ziemlich scharf begrenzt, epiphyll ungefähr gleich grosse braune Flecken verursachend, 2—6 mm im Durchmesser. Hyphen gegenständig und dicht netzartig verzweigt, mit den zahlreichen Hyphopodien oft grössere oder kleinere, fast lückenlose Häutchen bildend, durchscheinend schwarzbraun, 8—10 µ breit. Kopfförmige Hyphopodien sehr zahlreich, meist abwechselnd, mehr oder weniger, oft stark vorwärts gerichtet, nicht selten mit einer Seite der Traghyphe fest anliegend, 17—26 µ lang. Basalzelle zylindrisch oder gestutzt und verkehrt konisch, 3.5—10 ⇌ 6—10 µ. Scheitelzelle mehr oder weniger kugelig, selten breit eiförmig oder ellipsoidisch, oben breit abgerundet, selten fast abgestutzt, dann oft unregelmässig und stumpf eckig, 14—18—20 ⇌ 10—17 µ. Mukronate Hyphopodien meist nur im mittleren Teile der Rasen, flaschen- oder stumpf kegelförmig, oben meist allmählich verjüngt, mit dem oberen Drittel oft mehr oder weniger zurückgekrümmt, 20—24—30 ⇌ 8—10 µ. Myzelborsten zahlreich, gerade oder schwach gebogen, allmählich verjüngt und stumpf, selten ziemlich scharf zugespitzt, 200—350 ⇌ 10—14 µ. Perithezien zerstreut, 180—260 µ im Durchmesser. Sporen länglich oder breit spindelförmig, beidendig breit abgerundet und schwach, aber meist deutlich verjüngt, mit 4 Querwänden, an diesen mehr oder weniger, oft ziemlich stark

eingeschnürt, dunkel schwarzbraun, die mittlere Zelle schwach, aber meist deutlich vorspringend, 50—63 μ, selten bis 70 μ lang, 20—26 ⇌ 16—19 μ breit.

Dieser Pilz stimmt mit der Beschreibung der *M. batangasensis* sehr gut überein und ist damit sicher identisch. Die drei auf *Homalium* beschriebenen Arten *M. homalii* Hansf., *M. batangasensis* Hansf. und *M. homalii-dolichophylli* Hansf. et Deight. stehen einander sehr nahe und sind fast nur durch die Form und Länge der Borsten — ob hinreichend? — verschieden.

Meliola bicornis Wint. in Hedwigia XXV. p. 99 (1886).

Auf *Desmodium pulchellum.* Philippinen; Luzon; Cagayan Prov. I. 1924, leg. M. S. Clemens, Nr. 2830. — Auf *Shuteria vestita.* Benguet Prov.: Baguio, 16.—23. XII. 1925, leg. M. S. Clemens. — Auf *Desmodium quinquepetalum.* Tarlac Prov.: La Paz, XII. 1924, leg. M. S. Clemens, Nr. 6371.

Die beiden Kollektionen auf *Desmodium* stimmen mit den weiter unten als *M. heterocephala* angeführten Exemplaren in vieler Hinsicht überein, unterscheiden sich aber vor allem durch folgende Merkmale: Basalzelle der Hyphopodien meist etwas länger, ca. 4—6 μ lang. Borsten bis ca. 300 μ, bei Nr. 6371 bis 500 μ lang, sehr vereinzelt mit einem meist 10—20 μ unterhalb der Spitze befindlichen, kleinen, nur ca. 2.5—4 μ langen Zähnchen versehen. Perithezien 100—160 μ gross. Sporen 26—36 μ lang.

Ob der Pilz auf *Shuteria* auch hierher gehört, ist zweifelhaft, weil er nur sehr spärlich vorhanden und schlecht entwickelt ist. In bezug auf die Beschaffenheit des Myzels ist kein wesentlicher Unterschied zu finden, nur treten hier die kopfförmigen Hyphopodien zuweilen auch gegenständig auf. Die spärlichen Borsten werden bis 350 μ lang. Die wenigen Perithezien, die vorhanden waren, hatten einen Durchmesser von 140—160 μ; sie waren ganz unreif und enthielten nur junge Aszi ohne Sporen.

Meliola caesalpiniicola Deighton in Sydowia XI. p. 40 (1958).

Auf *Caesalpinia nuga.* Philippinen; Luzon; Zambales Prov.: Iba, II. 1924, leg. M. S. Clemens, Nr. 4504.

Stimmt mit der von Sydow in Fung. exot. unter Nr. 172 ausgegebenen Originalkollektion gut überein, die Rasen treten aber auch hypophyll auf, sind hier viel grösser und überziehen oft grosse Teile der Blattfläche gleichmässig. Die nur spärlich vorhandenen Borsten sind bis 350 μ lang. Sporen 40—46 ⇌ 16—19 ⇌ 10—14 μ.

Meliola callicarpae Syd. in Annal. Mycol. X. p. 80 (1912).

Auf *Callicarpa cana.* Philippinen; Luzon; Bulacan Prov.: Santa Maria, XI. 1924, leg. M. S. Clemens, Nr. 6089. — Auf *C. longi-*

petiolata. Luzon; Benguet Prov.: Mt. Pulog and vicinity, 24.—27. II. 1925, leg. M. S. Clemens, Nr. 5882.

Diese Art ist durch die kleinen, nur 10—15 ≒ 6—9 μ grossen, oft gegenständigen Hyphopodien gut charakterisiert und leicht kenntlich. Anzahl und Länge der Borsten ist sehr veränderlich; diese schwankt zwischen 180 μ und 550 μ.

Meliola callicarpaeicola Yamam. in Trans. Nat. Hist. Soc. Formosa, XXXI. p. 226 (1941).

Auf *Callicarpa formosana* Philippinen. Luzon; Tarlac Prov.: near Pura, XI. 1923, leg. M. S. Clemens, Nr. 2623.

Auf dem ziemlich reichlich vorhandenen Material ist der Pilz nur sehr spärlich und in schlecht entwickeltem Zustande vorhanden. Von der Beschreibung Yamamotos weicht er etwas ab.

Rasen sehr zart, meist ganz vereinzelt und steril. Hyphen mehr oder weniger wellig gekrümmt, kastanienbraun, 6—8.5 μ breit. Kopfförmige Hyphopodien mit zylindrischer, 4—8.5 μ langer Basalzelle und eiförmiger oder ellipsoidischer, oft etwas unregelmässiger, 10—15 ≒ 9—11 μ grosser Scheitelzelle. Mukronate Hyphopodien spärlich, 16—23 ≒ 6—10 μ, in eine kurze, oft nur ca. 3 μ lange Spitze verjüngt. Borsten sehr spärlich, bis 180 μ lang, 6.5—8 μ breit, stumpf zugespitzt. Perithezien 130—160 μ im Durchmesser. Wandzellen kaum oder nur sehr schwach konvex vorspringend. Sporen länglich, kastanienbraun, mit 4 Querwänden, kaum oder schwach eingeschnürt, 30—36 ≒ 13—15 ≒ 9—11 μ.

Meliola capensis K. et C. var. *euphoriae* Hansf. in Sydowia, Beiheft I. p. 102 (1957).

Auf *Euphoria* spec. (? *didyma*). Philippinen; Luzon; Prov. Zambales: Olongapo, III. 1924, leg. M. S. Clemens, Nr. 2413.

Das vorliegende, sehr zahlreiche Material zeigt meist nur ganz sterile, mit einzelnen, meist unreifen Perithezien besetzte, epiphyll, seltener hypophyll auftretende Rasen, die aus locker verzweigten, meist ziemlich geraden, 5—8 μ breiten, durchscheinend schwarzbraunen Hyphen bestehen. Myzelborsten spärlich, bis 500 μ lang, meist gerade, allmählich verjüngt, stumpf zugespitzt, selten fast abgestutzt, 6—8 μ breit. Kopfförmige Hyphopodien gegenständig, seltener abwechselnd, mehr oder weniger vorwärts gerichtet, mit kurz zylindrischer oder stumpf und verkehrt konischer Basalzelle und birnförmiger, oben mehr oder weniger breit abgestutzter Scheitelzelle. Mukronate Hyphopodien oft ähnlich und mit den kopfförmigen vermischt, oft so, dass auf der einen Seite der Hyphe sich ein kopfförmiges, auf der anderen ein mukronates Hyphopodium befindet.

Fast alle Rasen sind von einem sterilen Parasiten befallen, dessen Myzel aus reich verzweigten, 2—3 μ breiten, zartwandigen, schon ganz verschrumpften Hyphen besteht.

Meliola elattostachydis Petr. n. spec.

Plagulae amphigenae, sed plerumque epiphyllae, densiusculae, subvelutaceae, ambitu orbiculares vel ellipticae, sed semper plus minusve irregulares, indistincte limitatae, ca. 1—3 mm diam., raro- et plerumque confluendo tantum paulo majores; hyphae pellucide atro-brunneae, crassiuscule tunicatae, rectae, opposite et laxe reticulato-ramosae, 6—9 μ crassae; hyphopodia capitata opposita, rarissime alternata, regulariter antrorsa, interdum fere horizontaliter patentia, recta 10—16 μ longa; cellula basali oblique cylindracea vel truncato-obconica, 3—5 ⇌ 5—6 μ; cellula apicali ellipsoidea vel breviter cylindracea, raro subconica, tunc saepe parum inaequilatera, antice late rotundata vel raro subtruncata, 6.5—13 ⇌ 6—7.5 μ; hyphopodia mucronata non visa. Setae mycelicae laxe vel subdense dispersae, e basi plus minusve adunca rectae vel subarcuato-curvulae, fere opace atro-brunneae, vel atro-olivaceae, paulatim attenuatae, nunc obtusiuscule acuminatae, nunc plus minusve truncatae, 250—500 μ, raro usque ad 560 μ longae, 8—10 μ latae; perithecia irregulariter et laxe dispersa, solitaria, raro 2—3 subaggregata, globosa, 120—200 μ diam.; cellulae parietis exteriores pellucide atro-brunneae, irregulariter angulosae, 7—15 μ diam., raro paulo majores, vix vel lenissime tantum prominulae; sporae oblongae vel anguste ellipsoideae, utrinque late rotundatae, vix vel lenissime attenuatae, 4-septatae, vix vel parum constrictae, 32—36 ⇌ 15—17 ⇌ 10—12 μ.

Auf *Elattostachys* spec. Philippinen; Luzon; Ilocos Sur Prov.: V.—VI. 1925, leg. M. S. Clemens, Nr. 6698.

Auf *Elattostachys* ist bisher noch keine Meliolinee beschrieben worden. Der mir vorliegende Pilz gehört dem Formenkreise der *M. capensis* (K. et C.) Theiss. an, ist davon aber besonders durch die Form der kleineren Hyphopodien, durch die an der Spitze nicht gezähnelten Borsten und durch die kleineren Sporen verschieden. Obwohl zahlreiche Rasen genau abgesucht wurden, konnten mukronate Hyphopodien nicht gefunden werden, müssen daher nur selten gebildet werden. Die Borsten sind meist stumpf zugespitzt, dann bis zur Spitze ziemlich gleichmässig schwarzbraun; einzelne Borsten färben sich oben allmählich heller und sind dann an der Spitze nur hell gelbbräunlich oder fast subhyalin und mehr oder weniger scharf abgestutzt.

Meliola erioglossi Hansf. in Sydowia, Beiheft I. p. 107 (1957).

Auf *Erioglossum rubiginosum.* Philippinen; Luzon; Pangasinan Prov.: Anda, 31. III. 1926, leg. M. S. Clemens, Nr. 6918.

Rasen nur epiphyll, klein aber sehr zahlreich, mehr oder weniger zusammenfliessend und oft grosse Teile der Blattfläche überziehend. Myzelborsten bis 300 μ lang, 6—8 μ breit. Perithezien 90—140 μ gross. Sporen etwas kleiner, 30—36 ⇌ 13—16 ⇌ 9—11.5 μ.

Meliola grewiae Hansf. in Sydowia X. p. 74 (1957).

Auf *Grewia* cfr. *acuminata*. Philippinen; Luzon; Zambales Prov.: Olongapo, III. 1924, leg. M. S. Clemens, Nr. 2462.

Myzelrasen beiderseits, meist jedoch epiphyll, über die ganze Blattfläche mehr oder weniger gleichmässig zerstreut, im Umriss ganz unregelmässig oder rundlich, unscharf begrenzt, 1—3 mm im Durchmesser, durch Zusammenfliessen auch grösser werdend. Hyphen sehr locker und meist gegenständig verzweigt, durchscheinend olivbraun, 4—6 μ breit. Kopfförmige Hyphopodien abwechselnd, locker stehend, mit 3—7 ⇌ 5—6 μ grosser Basalzelle und eiförmiger oder ellipsoidischer Scheitelzelle. Myzelborsten fast nur am Grunde der Perithezien, aber auch hier nicht immer vorhanden, bogig gekrümmt oder fast gerade, zuweilen etwas geschlängelt, oben verjüngt und stumpf zugespitzt, durchscheinend schwarzbraun, 70—120 ⇌ 6—8 μ. Perithezien einzeln, seltener zu mehreren dicht gehäuft, 130—170 μ. Sporen länglich, beidendig breit abgerundet, kaum oder nur sehr schwach verjüngt, mit 4 Querwänden, an diesen kaum oder schwach eingeschnürt, schwarzbraun, 30—36 ⇌ 12.5—14 ⇌ 10 μ.

Von der Beschreibung des Autors unterscheidet sich die oben genannte Kollektion durch die nur sehr spärlich vorhandenen, kürzeren Borsten.

Meliola heterocephala Syd. in Annal. Mycol. XIV. p. 356 (1916).

Auf *Flemingia Cumingiana*. Philippinen; Pangasinan Prov.: Rosales and vicinity, 1.—14. 1925, leg. M. S. Clemens, Nr. 5938. Pampanga Prov.: Porac, 30. X. 1923, leg. M. S. Clemens, Nr. 4647.

Die beiden Kollektionen stimmen miteinander völlig überein, weichen aber von einem mir vorliegenden Originalexemplare in mancher Hinsicht, vor allem durch die an der Spitze nicht oder kaum verbreiterten Borsten ab, weshalb ich hier eine kurze Beschreibung folgen lasse.

Rasen epiphyll, sehr zart, meist ganz unregelmässig, selten rundlich, bis ca. 5 mm gross, oft genähert, dann zusammenfliessend und grosse Teile des Blattes überziehend. Hyphen meist etwas wellig gekrümmt, 4.5—6.5 μ breit. Kopfförmige Hyphopodien abwechselnd, 10—14 μ lang; Basalzelle 1.5—4 μ, selten bis 5 μ lang; Scheitelzelle mehr oder weniger kugelig, oft von oben nach unten deutlich zusammengedrückt, selten breit eiförmig oder ellipsoidisch, 6.5—14 ⇌ 6—10 μ, bisweilen sehr stark vorwärts gerichtet, dann mehr oder weniger unregelmässig. Mukronate Hyphopoden aus fast kugeliger oder ellipsoidischer Basis plötzlich zusammengezogen und in die kurze, bis 3 μ breite Spitze übergehend, 16—20 ⇌ 6—20 μ. Myzelborsten spärlich, meist am Grunde der Perithezien, gerade oder schwach gebogen, durchscheinend schwarzbraun, 120—250 ⇌ 6—8 μ, von zweierlei Form: 1. stumpf abgerundet oder zugespitzt, 2. an der Spitze in

einer Länge von 15—20—40 μ mit 2—6—8 sehr verschieden langen und meist ganz unregelmässig, nur an der äussersten Spitze gabelig angeordneten, 5—8 μ, selten bis 14 μ langen, 1.5—3 μ breiten, meist zugespitzten, schwach gekrümmten, zuweilen horizontal oder etwas zurückgebogenen Zähnen versehen. Perithezien zerstreut, kugelig, 80—130 μ, selten bis 140 μ gross. Zellen der Membran unregelmässig rundlich-eckig, 6—10 μ, selten bis ca. 13 μ gross. Sporen länglich oder fast zylindrisch, beidendig breit abgerundet, kaum verjüngt, mit 4 Querwänden, an diesen schwach eingeschnürt, durchscheinend schwarzbraun, 26—34 ⇌ 10—14 ⇌ 9—11 μ.

Die Perithezien zeigen hier in der Mitte des Scheitels eine unscharf begrenzte, rundlich eckige Stelle von ca. 15 μ Durchmesser, die durch rundlich eckige, 3—4 μ grosse, hyaline Zellen ausgefüllt wird und als ein untypisches Ostiolum aufgefasst werden muss. Auch bei anderen Arten habe ich derartige untypische Ostiola beobachten können.

Meliola hoyae Sacc. in Atti Accad. Ven. Trent. Istr. III. p. 10 (1917).

Auf einer Asclepiadacee, wahrscheinlich *Hoya* spec. Sumatra: Polonia, Medan, V. 1927, leg. K. B. Boedijn.

Der Pilz ist schlecht entwickelt, die Gehäuse enthalten nur selten einzelne Sporen oder ganz verschrumpfte Aszi. Rasen klein, 0.5—3 mm im Durchmesser, mehr oder weniger rundlich, nur epiphyll, kohlschwarz. Hyphen reich und dicht verzweigt, 6.5—8 μ breit. Kopfförmige Hyphopodien zahlreich, die Zwischenräume zwischen den Hyphen fast ganz ausfüllend oder nur kleine Lücken frei lassend. Basalzelle zylindrisch, 3—6.5 μ lang. Scheitelzelle ellipsoidisch oder länglich eiförmig, 13—17 ⇌ 8—11 μ. Myzelborsten 180—300 ⇌ 7—10 μ, fast opak schwarzbraun, oben allmählich verjüngt und stumpf zugespitzt, seltener ziemlich scharf abgestutzt, nie gezähnt. Perithezien 90—180 μ gross. Sporen länglich, schwarzbraun, an den 4 Querwänden meist deutlich eingeschnürt, 34—46 ⇌ 16—20 ⇌ 11—14 μ.

Weicht von der Beschreibung durch die an der Spitze nie gezähnten Borsten ab, stimmt aber gut überein und ist wohl sicher identisch.

Meliola indica Syd. in Annal. Mycol. IX. p. 382 (1911).

Auf *Barringtonia acutangula.* Philippinen; Luzon; Bulacan Prov.: San Miguel, IX. 1924, leg. M. S. Clemens, Nr. 4821.

Rasen nur epiphyll, rundlich, bis 5 mm gross, hypophyll mehr oder weniger deutliche, bräunliche Verfärbungen verursachend. Perithezien zerstreut, 120—180 μ gross. Borsten ziemlich spärlich, meist gerade, stumpf zugespitzt, ca. 100—180 μ lang, 8—10 μ dick. Sporen länglich, beidendig meist etwas verjüngt, stumpf abgerundet, 36—44 ⇌ 14—17 ⇌ 11—13 μ.

Meliola ixorae Yates in Philipp. Journ. Sci. C. Botany XII. p. 365 (1917).

Auf *Ixora Cumingiana.* Philippinien; Luzon; Bitaan Prov.: Balanga, V. 1923, leg. M. S. Clemens, Nr. 1437.

Rasen beiderseits, häufiger hypophyll, ganz unregelmässig, 1.5—8 mm im Durchmesser, selten rundlich, oft genähert, zusammenfliessend und grösser werdend. Borsten locker zerstreut, einfach, meist bogig oder unregelmässig wellig gekrümmt, selten gerade, stumpf, zugespitzt, 300—400 μ, selten bis 500 μ lang. Perithezien 140—200 μ im Durchmesser, sehr locker zerstreut, oft ganz vereinzelt. Fruchtschicht unreif und meist ganz verdorben. Fast alle Rasen sind von einer Dimeriee befallen, deren locker zerstreute Perithezien meist kleiner und auch durch den abweichenden Bau ihrer Membran von den *Meliola*-Gehäusen leicht zu unterscheiden sind.

Meliola jasminicola P. Henn. in Hedwigia XXXIV. p. 11 (1895).

Auf *Jasminum aculeatum.* Philippinen; Luzon; Ilocos Sur Prov. V.—VI. 1925, leg. M. S. Clemens, Nr. 6616. Ilocos Sur Prov. Santa Maria, II. 1923, leg. M. S. Clemens Nr. 392; Tarlac Prov.: La Paz, XII. 1924, leg. M. S. Clemens, Nr. 6416. — Auf *Jasminum* spec. Luzon; Pangasinan Prov.: Asingan, XI. 1923, M. S. Clemens, Nr. 3140.

Die oben genannten Kollektionen stimmen miteinander gut überein, weichen aber von den Beschreibungen etwas ab: Scheitelzelle der kopfförmigen Hyphopodien zylindrisch oder ellipsoidisch, unten kaum oder nur schwach verjüngt; Myzelborsten nicht besonders zahlreich, meist etwas bogen- oder schwach S-förmig gekrümmt oder gerade, stumpf zugespitzt, bis ca. 600 μ lang. Perithezien 130—180 μ gross. Sporen länglich oder schmal ellipsoidisch, 30—36—40 ⇌ 14—17—20 ⇌ 10—13 μ. Das Exemplar 6416 hat bis 650 μ lange Borsten und etwas kleinere, 30—36 ⇌ 15—17 ⇌ 10—13 μ grosse Sporen.

Mit Rücksicht auf die relativ kleineren, nicht über 40 μ langen Sporen würden alle oben genannten Kollektionen besser zu *M. jasmini* Hansf. et Stevens passen, weichen aber von der Beschreibung dieser Art durch die nach unten kaum oder nur schwach verjüngte Scheitelzelle der Hyphopodien und längere Myzelborsten ab.

Meliola kawandensis Hansf. in Sydowia X. p. 77 (1957).

Auf dünneren Ästchen von *Dalbergia ferruginea.* Philippinen; Tarlac Prov. III. 1923, leg. M. S. Clemens, Nr. 543.

Dieser Pilz, der am vorliegenden Material nur auf dünneren Ästchen vorkommt, stimmt mit der Beschreibung gut überein und muss wohl als identisch erachtet werden.

Rasen nur auf den dünneren Ästchen wachsend, bald ganz vereinzelt, bald locker zerstreut, oft aber auch zahlreich, dicht beisammen stehend, zusammenfliessend und grössere Teile der Ästchen weithin und ringsum überziehend, kohlschwarz, durch die ausserordentlich dicht stehenden Borsten samtartig. Hyphen nur am Rande

der Rasen deutlich erkennbar, schwarzbraun, dickwandig, unregelmässig und dicht verzweigt, ziemlich gerade, 7—9—10 μ breit. Kopfförmige Hyphopodien sehr zahlreich, abwechselnd und gegenständig mit sehr kurzer, oft kaum erkennbarer, 1—4 μ langer, ca. 10 μ breiter Stielzelle und kugeliger oder sehr breit ellipsoidischer, 10—14 ⇌ 10—13 μ grosser Scheitelzelle. Mukronate Hyphopodien ganz vereinzelt, ca. 20 μ lang, unten 5—6.5 μ, oben 3—3.5 μ breit. Gegen die Mitte hin werden die Rasen durch die dort ausserordentlich zahlreich gebildeten Hyphopodien sehr dicht und bilden fast lückenlose Häutchen. Myzelborsten sehr zahlreich und dicht stehend, einfach, aus knorrig verbogener Basis meist ganz gerade oder nur schwach bogig gekrümmt, fast opak schwarzbraun, nach oben allmählich, aber meist nur schwach verjüngt und kaum heller gefärbt, stumpf zugespitzt, 160—240 ⇌ 10 μ. Perithezien in der Mitte der Rasen lockere oder ziemlich dichte Herden bildend. Sporen länglich, beidendig breit abgerundet, kaum oder nur schwach verjüngt, gerade, zuweilen etwas ungleichseitig, schwarzbraun, mit 4 Querwänden, kaum oder schwach eingeschnürt, 35—43 ⇌ 15—17 ⇌ 10—13 μ.

Meliola knoxiae Petr. n. spec.

Plagulae amphigenae, imprimis hypophyllae, ambitu irregulares, 2—3 mm diam. sed plerumque numerosissimae, tunc fere omnino confluentes et saepe totam folii superficiem obtegentes, atrae, subvelutinae; hyphae irregulariter reticulato-ramosae, plus minusve undulatae, brunneae vel olivaceae, 4—7 μ crassae; hyphopodia capitata pauca, alternata, antrorsa vel subpatentia, 15—20 μ longa; cellula basali cylindracea, 4—6 ⇌ 3.5—4.5 μ; cellula apicali ovoidea vel ellipsoidea, raro fere globosa, integra, antice late rotundata, 10—13 ⇌ 9—12 μ; hyphopodia mucronata rara, opposita vel alternantia, ampullacea, e basi ca. 6 μ lata paulatim vel abruptiuscule attenuata, 13—15 μ longa. Setae mycelicae numerosae, e basi plus minusve geniculata rectae, arcuatae vel irregulariter curvulae, fere opace atro-brunneae, paulatim attenuatae, obtusae, raro acutiusculae, 100—220 ⇌ 5—8 μ; perithecia laxe vel subdense dispersa, globosa, 70—120 μ diam.; parietis membranacei cellulae irregulariter angulosae, obscure atro-brunneae, 6—12 μ diam. metientes, in superficie non vel indistincte prominulae; sporae oblongae vel fere cylindraceae, utrinque late rotundatae, vix vel lenissime attenuatae, pellucide atro-brunneae, 4-septatae, leniter constrictae, 23—30 ⇌ 10—12 ⇌ 7—9 μ.

Auf *Knoxia corymbosa.* Philippinen; Luzon; Cagayan Prov.: Solana, 2. I. 1924, leg. M. S. Clemens, Nr. 1755.

Unter den zahlreichen, bisher auf Rubiaceen bekannt gewordenen Meliolineen steht der hier beschriebene Pilz der *M. boninensis* Speg. wohl ziemlich nahe. Er unterscheidet sich davon aber durch

kürzere Myzelborsten, kleinere Perithezien und kleinere, meist nur 24—28 μ lange Sporen.

Meliola lasianthi Petr. n. spec.

Plagulae amphigenae, sed plerumque epiphyllae, irregulariter dispersae, ambitu omnino irregulares, raro fere orbiculares, minutae, indistincte limitatae, 0.5—2 mm diam., raro paulo majores; hyphae opposite et reticulato-ramosae, rectiusculae vel parum undulatae, crasse tunicatae, pellucide atro-brunneae, 5—7 μ latae; Hyphopodia capitata remotiuscule alternata, recta, antrorsa vel subpatentia, 15—21 μ longa; cellula apicali ovoidea vel late ellipsoidea, raro subglobosa, integra, antice late rotundata, raro subtruncata, 12—16 ⇌ 10—14; cellula basali cylindracea vel truncato-obconica, 3—6 ⇌ 5—6 μ; hyphopodia mucronata pauca, opposita vel alternata, ampullacea e basi ca. 6 μ lata paulatim vel abruptiuscule attenuata, antice truncata, 16—23 μ longa; setae mycelicae paucae, plerumque e peritheciorum basi oriundae, fere opace atro-brunneae, 150—250 ⇌ 6—8.5 μ, plus minusve arcuatae, raro rectae, in apice interdum subrecurvatae, paulatim acuminatae, rarissime in apice inaequaliter et minute furcatae ramulis seu dentibus subacuminatis, 5—16 μ longis, 4.5 μ crassis; perithecia laxe dispersa, globosa, 160—180 μ diam.; parietis membranacei cellulae irregulariter angulosae, 8—15 μ diam. vix vel usque ad 14 μ prominulae; sporae oblongae vel anguste ellipsoideae, utrinque late rotundatae, vix vel parum attenuatae, pellucide atro-olivaceae, 4-septatae, ad septa non vel leniter constrictae, 33—40 ⇌ 13—15 ⇌ 10—12.

Auf *Lasianthus microphyllus.* Philippinen; Luzon; Bontoc Prov.: Pauai Benguet to Mt. Data, 24.—31. XII. 1925, leg. M. S. Clemens, Nr. 7316.

Von den zahlreichen *Meliola*-Arten, die bisher auf Rubiaceen beschrieben wurden und ästige oder gezähnte Borsten haben, passt der oben beschriebene Pilz noch am besten zu *M. mussendae* Syd. Trotz guter Übereinstimmung in vielen Merkmalen ist Sydow's Art mit Rücksicht auf die an der Spitze stumpfen, hier oft auch etwas verbreiterten, gleichsam aufgeblasenen Borsten und kleineren Sporen als verschieden zu erachten.

Meliola litseae Syd. in Annal. Mycol. XV. p. 187 (1917).

Auf *Litsea luzonica;* Philippinen; Luzon; Pampanga Prov.: Mt. Arayat, III. 1923, leg. M. S. Clemens, Nr. 630.

Rasen fast nur hypophyll, unregelmässig oder fast rundlich, bis ca. 3 mm im Durchmesser, selten noch etwas grösser. Kopfförmige Hyphpodien abwechselnd, bis ca. 23 μ lang, mit breit ei- oder birnförmiger, selten fast kugeliger Scheitelzelle. Myzelborsten spärlich und zerstreut, zum grössten Teil wahrscheinlich schon abgefallen, bis ca. 800 μ lang, 8—10 μ breit, stumpf abgerundet oder

fast abgestutzt seltener fast zugespitzt, ganz vereinzelt auch mit 1—2 sehr kleinen, bis ca. 5 μ langen Zähnchen versehen. Perithezien 130—160 μ im Durchmesser. Sporen 36—46 ⇌ 18—20 ⇌ 13—15 μ.

Entspricht ganz gut der var. *rotundipoda* Hansf., weicht aber durch längere Borsten und etwas grössere Sporen ab.

Meliola macarangae Syd. in Annal. Mycol. XV. p. 188 (1917).

Auf *Macaranga bicolor*. Philippinen; Luzon; Bataan Prov.: Samal, V. 1923, leg. M. S. Clemens, Nr. 1272.

Stimmt mit einem mir vorliegenden Originalexemplare gut überein, hat aber längere, meist 300—500 μ, vereinzelt bis 550 μ lange Borsten. Nur zwei Perithezien konnten gefunden werden, die einige längliche ellipsoidische, ca. 40—50 ⇌ 17—21 ⇌ 14—16 μ grosse Sporen enthielten. Der Pilz greift das Blatt ziemlich stark an und verursacht auf der Oberseite graubraune, von einer oft ziemlich breiten Verfärbungszone umgebene Flecken.

Meliola mangiferae Earle in Bull. New York Bot. Gard. III. p. 307 (1905).

Auf *Mangifera indica*; Philippinen; Luzon; Zambales Prov.: Olongapo, III. 1924, leg. M. S. Clemens, Nr. 2410.

Das vorliegende Material ist sehr spärlich und zeigt den Pilz nur in altem Zustande. Myzelborsten und Perithezien sind zum grössten Teile schon abgefallen. Die Sporen wurden etwas kleiner, nämlich 34—43 μ lang und 15—17 ⇌ 11—14 μ gross gefunden.

Meliola melicopes Petr. n. spec.

Plagulae amphigenae, sed plerumque hypophyllae, regulariter et laxe dispersae, saepe solitariae, ambitu orbiculares, sed saepe plus minusve irregulares, 1—3 mm diam., bene limitatae, densae, velutinae, aterrimae; hyphae laxe opposite et dense reticulato-ramosae, rectiusculae, raro undulatae, fere opace atro-brunneae, crasse tunicatae, 6—10 μ latae, hyphopodia capitata numerosissima, alternantia, raro etiam opposita, plus minusve antrorsa, raro subpatentia, recta, 14—20 μ longa; cellula basali breviter cylindracea, 4—7 ⇌ 6—10 μ; cellula apicali late ovoidea vel ellipsoidea, interdum fere globosa, integra, antice late rotundata, postice vix vel lenissime attenuata, 10—15 ⇌ 9—14 μ; hyphopodia mucronata pauca plerumque in centro plagularum evoluta, anguste conoidea vel subampullacea, e basi 7—9 μ lata paulatim vel abruptiuscule attenuata, 16—20 μ longa; setae mycelicae numerosae, e basi geniculata rectae, raro leniter arcuatae vel irregulariter curvulae, 130—200 ⇌ 9—10.5 μ, atro-brunneae, sub apice usque ad 12.5 μ incrassatae, 4—6—8-dentatae, vel brevissime 1—2-furcatae, ramulis plus minusve, interdum fere horizontaliter patentibus, primariis usque ad 12 μ longis, 6—8 μ crassis,

secundariis obtusiusculis vel subacuminatis, saepe dilutius coloratis, 3.5—15 μ longis, 2.5—5 μ latis; perithecia irregulariter dispersa, in centro plagularum interdum subaggregata, globosa, 160—230 μ diam.; parietis membranacei cellulae irregulariter angulosae, fere opace arto-brunneae, 10—12.5 μ, raro usque ad 16 μ diam., in superficie vix vel ca. 6—10 μ prominulae; sporae oblongae vel subcylindraceae, utrinque late rotundatae, vix attenuatae, pellucide atro-brunneae, 4-septatae, plus minusve constrictae, 40—46 ⇌ 14—16 ⇌ 8—12 μ.

Auf *Melicope triphylla*. Philippinen; Luzon; Ilocos Sur. Prov.: Candon and vicinity V. 1925, leg. M. S. Clemens, Nr. 6794.

Von allen auf Rutaceen bekannt gewordenen Meliolineen lässt sich die oben beschriebene Art durch die Beschaffenheit der Borsten leicht unterscheiden. Das Myzel ist sehr dicht und bildet mit den Hyphpodien oft grössere oder kleinere, fast lückenlos zusammenhängende Häutchen.

Meliola meliosmatis Petr. n. spec.

Plagulae amphigenae vel plerumque hypophyllae, laxe dispersae, interdum solitariae, ambitu orbiculares vel ellipticae sed semper plus minusve irregulares sat distincte limitatae, subvelutinae, nigrescentes, 5—12 mm diam., raro etiam majores; hyphae irregulariter opposite ramulosae et dense reticulatae, rectiusculae vel leniter undulato-curvulae, pellucide atro-brunneae, crasse tunicatae, 6—9 μ latae; hyphopodia capitata 30—36 μ longa, alternata, non vel rarissime opposita, valde antrorsa vel subpatentia, recta, non raro inaequilatera vel curvula; cellula basali cylindracea vel obconica, 4—10 μ longa, 6—9 μ, raro usque ad 10 μ lata; cellula apicali ellipsoidea anguste ovoidea vel piriformi, antice late rotundata, rarissime plus minusve truncata vel sinuosa, 20—26 ⇌ 10—16 μ; hyphopodia mucronata e basi 5—10 μ lata paulatim vel abruptiuscule attenuata, 16—25 μ longa; setae mycelicae e basi adunca rectae, 300—750 ⇌ 7—10 μ, fere opace atro-brunneae, paulatim attenuatae, subacuminatae vel obtusiusculae, rectae vel subarcuatae; perithecia laxe dispersa, plerumque solitaria, globosa, 140—200 μ diam.; cellulae parietis membranacei rotundato-angulosae, 10—18 μ diam., exteriores vix vel parum convexo-prominulae; sporae oblongae vel anguste ellipsoideae, utrinque late rotundatae, vix vel leniter attenuatae, pellucide atro-brunneae, 4-septatae, plus minusve constrictae, 48—53 ⇌ 16—20 ⇌ 13—15 μ.

Auf *Meliosma* spec. Philippinen; Mindanao; Davao Prov.: Mt. Apo, VI. 1924, leg. M. S. Clemens, Nr. 5174.

Auf Vertretern der Sabiaceen, zu denen die Gattung *Meliosma* gehört, scheint bisher noch keine Meliolinee beschrieben worden zu sein. Die kopfförmigen Hyphopodien sind hier meist so stark vorwärts gekrümmt, dass sie nicht selten mit einer Seite fest an die Traghyphe angepresst sind.

Meliola neolitseae Yamamoto in Trans. Nat. Hist. Soc. Formosa XXXI. p. 24 (1941).

Auf einer Lauracee (Nr. 29541). Britisch Nord-Borneo; Mt. Kinabalu, Tenompok, 4. V. 1932, leg. M. S. Clemens.

Diese Kollektion habe ich in Sydowia VIII. p. 20 (1954) als *M. litseae* Syd. angeführt. Davon unterscheidet sich aber der Borneo-Pilz, weshalb er hier kurz beschrieben werden soll.

Rasen hypophyll, unregelmässig zerstreut, bisweilen genähert und zusammenfliessend, meist mehr oder weniger rundlich. Hyphen gegenständig oder unregelmässig verzweigt, oft wellig gekrümmt, 6—10 µ breit. Kopfförmige Hyphopodien abwechselnd, sehr selten gegenständig, vorwärts gerichtet, selten fast horizontal abstehend, 16—26 µ lang. Scheitelzelle eiförmig oder ellipsoidisch, selten fast kugelig, 13—17 ⇌ 10—14 µ; Basalzelle 4—9 µ lang, zylindrisch oder gestutzt und verkehrt kegelförmig. Mukronate Hyphopodien zerstreut, meist gegenständig, 16—23 ⇌ 8—10, oben bis auf ca. 3.5 µ verjüngt. Myzelborsten bald locker, bald ziemlich dicht zerstreut, 400—800 ⇌ 8—10 µ, stumpf zugespitzt oder abgerundet, oft auch mit zwei, selten mit 3—4 ca. 3—10 µ langen, 2—5 µ dicken, stumpf zugespitzten Zähnen versehen, selten fast gerade, meist bogig oder ganz unregelmässig gekrümmt. Die rings um die Perithezien stehenden Borsten sind meist gegen die Mitte des Gehäuses bogig gekrümmt und nur 60—160 µ, selten bis ca. 200 µ lang. Perithezien 130—180 µ im Durchmesser. Peritheziummembran aus unregelmässig eckigen, oft gestreckten, dann bis ca. 25 µ langen, 5—10 µ breiten, mehr oder weniger mäandrisch gekrümmten und aneinander gefügten Zellen bestehend. Sporen länglich oder gestreckt ellipsoidisch, beidendig kaum oder undeutlich verjüngt, breit abgerundet, durchscheinend schwarzbraun, an den vier Querwänden mehr oder weniger, oft ziemlich stark eingeschnürt, 43—52—57 ⇌ 20—23 ⇌ 13—17 µ.

Epiphyll sind auch Rasen einer *Meliola* vorhanden, die meist kleiner sind. Die meist nicht über 400 µ langen Myzelborsten sind fast nur am Rande der Perithezien vorhanden, die hier ca. 150—230 µ gross sind. In bezug auf alle anderen Merkmale stimmt der epiphyll wachsende Pilz mit dem hypophyll auftretenden völlig überein. Ich hatte ihn deshalb nur für die epiphylle Form des hypophyll vorhandenen Pilzes.

Mit der Beschreibung von *M. neolitseae* stimmt dieser Pilz gut überein, weshalb ich ihn jetzt damit identifiziert habe. Die sehr ähnliche *M. linderae* Yamam. soll sich nach der Beschreibung durch etwas breitere, niedergedrückt rundliche Scheitelzellen der Hyphopodien und kürzere Borsten unterscheiden. Die typische *M. litseae* Syd. hat längere, kopfförmige Hyphopodien und kleinere Sporen. Es kann jedoch keinem Zweifel unterliegen, dass sich alle diese Arten sehr nahe stehen; deshalb sind sie auch nur schwer zu unterscheiden.

Meliola notabilis Petr. n. spec.

Plagulae hypophyllae, dispersae, saepe solitariae, tenues, ambitu plerumque orbiculares, sed semper plus minusve irregulares, 2—8 mm diam., raro paulo majores, indistincte limitatae, griseae; hyphae plerumque undulatae vel irregulariter curvulae, saepe fere contortae, laxe ramosae, raro subrectae, 4—7 μ latae, brunneae vel pallide atro-brunneae, tenuiter tunicatae, partim in folii indumento quasi repentes; hyphopodia (?) capitata atypica, rarissima, probabiliter alternantia, plus minusve patentia, 26—43 μ longa; cellula basali cylindracea, 10—14 ⇌ 4—6 μ; cellula apicali ovoidea vel ellipsoidea, integra, antice late rotundata, 18—30 ⇌ 10—17 μ; hyphopodia mucronata non visa; setae mycelicae paucae vel subnumerosae, plerumque basin peritheciorum tantum circumdantes, rectae vel arcuatae, simplices, apicem versus plus minusve saepe leniter tantum attenuatae, obtusae, opace atro-brunneae, in apice saepe dilutius coloratae, 200—350 ⇌ 9—10 μ. Perithecia dispersa, globosa, 250—300 μ, raro usque ad 350 μ diam.; parietis membranacei cellulae irregulariter angulosae, fere opace atro-brunneae, ca. 10—20 μ diam., in superficie vix vel usque ad 15 μ prominulae; sporae oblongae vel fere cylindraceae, utrinque late rotundatae, vix attenuatae, rectae, pellucide atro-brunneae, 4-septatae, ad septa non vel lenissime constrictae, 33—50 ⇌ 14—17 ⇌ 12—13 μ.

Auf *Saurauia elegans,* Philippinen; Luzon; Benguet Prov.: Mt. Santo Tomas, 19. II. 1925, leg. M. S. Clemens, Nr. 6409.

Von dieser schönen, durch sehr charakteristische Merkmale ausgezeichneten Art liegt leider nur spärliches Material vor. Die Mycelhyphen kriechen zwischen den steifen Borsten der feinkörnig rauhen Blattfläche regellos herum und zeigen auch auf längeren Strecken weder Kopf- noch mukronate Hyphopodien; nur an einer einzigen Stelle konnten drei untypische Hyphopodien gefunden werden, die fast wie kurze, am Ende blasenartig angeschwollene, Seitenäste der Hyphen ausgesehen haben. Auch bei diesem Pilze zeigen die Perithezien in der Mitte des Scheitels eine unregelmässig eckige, ca. 20 μ Durchmesser erreichende Stelle, die durch hyaline, 4—6 μ grosse Zellen verschlossen erscheint und als vorgebildete Öffnung gedeutet werden muss. Die Aszi sind zuweilen 3—4-sporig.

Meliola otophorae Yates in Philipp. Journ. Sci. C. Botany, XIII. p. 235 (1918).

Auf *Otophora fruticosa* Philippinen; Luzon; Tarlac Prov. XIII. p. 235 (1918).

Diese Kollektion stimmt mit der Beschreibung gut überein und ist sicher identisch. Rasen epiphyll, bis ca. 6 mm gross, oft zusammenfliessend und grosse Teile der Blattfläche fast ganz überziehend. Hyphen schwarzbraun, 5—6.5 μ breit. Kopfförmige Hyphpodien 16—20 μ lang; Basalzelle 3—5 μ lang. Scheitelzelle eiförmig ellip-

soidisch, selten fast kugelig, zuweilen etwas stumpfeckig oder undeutlich buchtig und gelappt, 10—13 ⇌ 8—12 μ. Myzelborsten spärlich, meist nur am Rande der Perithezien, ca. 100—200 μ lang, sehr selten etwas länger. Perithezien 130—150 μ im Durchmesser. Sporen länglich, beidendig breit abgerundet, kaum verjüngt, mit 4 Querwänden, nicht oder schwach eingeschnürt, 26—36 ⇌ 12—14 ⇌ 9—11 μ.

Meliola pampangensis Petr. n. spec.

Plagulae, ut videtur, semper epiphyllae, laxe vel subdense dispersae, ambitu orbiculares vel ellipticae, saepe plus minusve irregulares 1.5—6 mm diam. subdistincte limitatae, interdum aggregatae, tunc confluentes et magnam folii partem occupantes, atrae, velutinae; hyphae opposite et reticulato-ramosae ± curvulae, 5—8 μ latae, pellucide atro-brunneae, crassiuscule tunicatae; hyphopodia capitata subnumerosa alternantia, saepe etiam in uno hyphae latere evolutae, 13—20 μ longae; cellula basali cylindracea vel truncato-obconica 4—7 μ longa, 5—6.5 μ lata; cellula apicali ellipsoidea vel ovoidea, raro fere globosa interdum indistincte et obtuse angulosa, 9—14 ⇌ 11—13 μ; hyphopodia mucronata rarissima, ampullacea 14—18 ⇌ 5—6.5 μ; setae mycelicae numerosissimae e basi plus minusve geniculatae rectae, vix vel parum arcuatae, interdum subundulatae vel irregulariter curvulae, 150—200 ⇌ 7—9 μ, subopacae, atro-brunneae, apicem versus paulatim attenuatae et dilutiores, in apice late rotundatae et fere semper distincte dilatatae vel rarissime 2-dentatae, dentibus divergentibus, obtusis, 3—5 ⇌ 4—6 μ; perithecia laxe dispersa vel 2—4-subaggregata, globosa, 100—170 μ diam.; parietis membranacei cellulae rotundato-angulosae, pellucide atro-olivaceae, 10—18 μ diam. in superficie vix vel usque ad 10 μ prominulae; sporae oblongae, utrinque late rotundatae, postice saepe leniter sed distincte attenuatae, rectae, 4-septatae, leniter constrictae 27—33—36 ⇌ 13—15 ⇌ 10—11 μ.

Auf *Buddleia asiatica,* Philippinen; Luzon; Pampanga Prov.: Stotsenberg, III. 1923, leg. M. S. Clemens, Nr. 2224.

Meliola panici Earle in Muehlenbergia I. p. 12 (1901).

Auf *Panicum* spec. Philippinen; Zambales Prov.; Olongapo, III. 1924, III. 1924, leg. M. S. Clemens, Nr. 203. — Auf *Panicum Warburgii;* Ilocos Sur. Prov. V.—VI. 1925, leg. M. S. Clemens, Nr. 6777.

Auf diesen Exemplaren ist der Pilz nur sehr schlecht entwickelt. Die meisten Rasen sind steril. Myzelborsten bis 550 μ lang, Perithezien 100—150 μ im Durchmesser, Sporen 32—38 ⇌ 12—14 ⇌ 9—11 μ.

Andere von Clemens gesammelte Exemplare auf *Panicum* und anderen Gräsern sind leider schon ganz alt oder durch Parasiten verdorben.

Meliola parvula Syd. in Leafl. Philipp. Bot. VI. p. 1925 (1913).

Auf *Aglaia* spec.; Philippinen; Mindanao; Davao Prov.: Mt. Apo, V. 1924, leg. M. S. Clemens, Nr. 7579.

Rasen fast nur hypophyll, meist unregelmässig, oft mehr oder weniger weit ausgebreitet, ziemlich zart; Hyphen 5—6.5 μ breit, durchscheinend schwarzbraun. Kopfige Hyphopodien 10—16 μ lang, vorwärts gerichtet, seltener auch etwas zurückgekrümmt; Basalzelle 2—4 μ lang; Scheitelzelle zylindrisch oder etwas konisch, oben breit abgerundet 10—14 ⇌ 6—7 μ; Myzelborsten ziemlich spärlich, meist gerade, selten schwach bogig gekrümmt, bis ca. 600 μ lang, 6—8 μ breit; Perithezien sehr zerstreut, 100—160 μ im Durchmesser; Sporen länglich, beidendig breit abgerundet, kaum verjüngt, schwarzbraun, 4-zellig, kaum oder schwach eingeschnürt, 30—36 ⇌ 14—16 ⇌ 10—12 μ.

Meliola peltata Doidge in Trans. Roy Soc. South Africa V. p. 727 (1917).

Auf *Podocarpus Blumei;* Philippinen; Luzon; Isabella Prov.: Mt. Moises, 16.—27. IV. 1926, leg. M. S. Clemens, Nr. 7437.

Rasen hypo- seltener auch epiphyll, bald klein nur ca. 3—8 mm gross, oft genähert, dann zusammenfliessend und viel grösser werdend, ganz unregelmässig, oft fast eisblumenartig verästelt. Kopfförmige Hyphopodien sehr zahlreich, meist stark vorwärts gerichtet, dann fast parallel neben der Traghyphe liegend, mit zylindrischer, ca. 5—18 μ langer Basalzelle und 12—20 μ langer, 9—15 μ breiter Scheitelzelle. Myzelborsten spärlich, wahrscheinlich schon abgefallen, gerade oder schwach bogig gekrümmt, bis ca. 750 μ lang, 8—11 μ breit, opak schwarzbraun, sehr allmählich verjüngt, oben etwas heller gefärbt, stumpf zugespitzt. Perithezien ganz vereinzelt, wahrscheinlich bereits abgefallen, 250—350 μ im Durchmesser; Sporen breit spindelförmig, oft ungleichseitig oder schwach gekrümmt, beidendig etwas verjüngt, breit abgerundet, fast schwarzbraun, 50—70 ⇌ 23—26 μ, mit 3 Querwänden, von denen sich die eine ungefähr in der Mitte befindet, während die beiden anderen gegen die Enden herabgerückt sind; deshalb sind die beiden, breit konischen Endzellen nur 10—14 μ, die zwei mittleren Zellen aber fast doppelt so lang.

Diese schöne, durch die vom gewöhnlichen *Meliola*-Typus abweichende Form der Sporen sehr ausgezeichnete Art war bisher nur aus Südafrika bekannt. Das mir vorliegende, ziemlich zahlreiche Material ist leider schon ganz alt.

Meliola phyllanthicola Hansf. et Deighton in Sydowia X. p. 85 (1957).

Auf *Phyllanthus* spec. Sumatra: Pantei Tjermin, Serdang, V. 1926, leg. K. B. Boedijn.

Rasen epiphyll, klein, mehr oder weniger rundlich, 1—2 mm gross, locker oder dicht zerstreut, bisweilen zusammenfliessend und grösser werdend; Hyphen gegenständig und dicht netzig verzweigt,

6—7 μ breit; kopfförmige Hyphopodien abwechselnd, sehr selten gegenständig, mit 2.5—4 μ langer, 5—6.5 μ breiter Basal- und eiförmiger oder ellipsoidischer, 9—11 ⇌ 7—10 μ grosser Scheitelzelle. Myzelborsten spärlich, meist nur am Rande der 100—160 μ grossen Perithezien stehend, 100—180 μ lang, 7—9 μ breit. Sporen länglich zylindrisch, an den 4 Querwänden kaum oder schwach eingeschnürt, 30—35 ⇌ 13—14 ⇌ 10—12 μ. Der oben genannte Pilz stimmt mit der Beschreibung sehr gut überein und muss mit *M. phyllanthicola* identifiziert werden.

Meliola pterocarpi Yates in Philipp. Yourn. Sci. C. Botany XIII. p. 235 (1918).

Auf *Pterocarpus indicus.* Sumatra: K. Baroe, Medan, XII. 1926, leg. K. B. Boedijn.

Rasen nur epiphyll, mehr oder weniger rundlich, 1—5 mm im Durchmesser, locker oder dicht zerstreut, nicht selten zusammenfliessend und grössere Teile des Blattes vollständig überziehend. Myzelborsten gerade oder schwach bogig gekrümmt, nach oben allmählich verjüngt, ziemlich scharf zugespitzt, fast opak schwarzbraun, 130—240 ⇌ 7—9 μ, ganz vereinzelt mit einem unten deutlich abgesetzten, zugespitzten, 6—20—30 μ langen, viel heller gefärbten Endstück versehen. Perithezien 110—140 μ gross. Sporen länglich, beidendig breit abgerundet, kaum verjüngt, an den 4 Querwänden schwach, seltener ziemlich stark eingeschnürt, dunkel schwarzbraun, 34—40—44 ⇌ 12—14 ⇌ 10—11.5 μ.

Meliola roureae Syd. in Annal. Mycol. XV. p. 191 (1917).

Auf *Rourea erecta.* Philippinen; Luzon; Ilocos Sur Prov.: Santa Maria, II. 1923, leg. M. S. Clemens, Nr. 384. Luzon; Manila: Del Norte, XII. 1923, leg. M. S. Clemens, Nr. 3245. — Auf *Rourea* spec. Luzon; Tarlac Prov.: Paniqui, I. 1925, leg. M. S. Clemens.

Meliola scaevolae Syd. in Annal. Mycol. XII. p. 551 (1914).

Auf *Scaevola Koenigii.* Sumatra: Kuala Bedagai, 3. IV. 1927, leg. K. B. Boedijn.

Die kleinen, mehr oder weniger rundlichen, nur ca. 1—3 mm grossen Rasen sind meist über grosse Teile der Blattoberseite ziemlich gleichmässig und dicht zerstreut. Myzelborsten sehr spärlich; meist sind nur 1—3 am Grunde der Gehäuse vorhanden. Sie sind meist 100—200 μ lang, stumpf zugespitzt, seltener ziemlich scharf abgestutzt, dann an der Spitze heller gefärbt, zuweilen subhyalin. Perithezien 100—140 μ gross, ganz unreif, ohne Sporen. *M. scaevolae* ist durch die mehr oder weniger kugeligen, gegen die Basalzelle scharf abgesetzten Scheitelzellen der überaus zahlreichen kopfförmigen Hyphopodien sehr ausgezeichnet und leicht kenntlich.

Meliola stenospora Wint. in Hedwigia, XXV. p. 97 (1886).

Auf *Piper* spec. Philippinen; Luzon; Pampanga Prov.: Stotsenburg, X. 1923, leg. M. S. Clemens, Nr. 2613.

Das spärliche Material dieser Kollektion zeigt nur hypophyll einige, durch einen Parasiten verdorbene Rasen des Pilzes, die der Beschreibung völlig entsprechen. Myzelborsten sehr spärlich, bis 550 μ lang, 10—13 μ dick. Perithezien 130—160 μ; Sporen 32—40 ⇌ 11—13 ⇌ 10—12 μ.

Meliola Sydowiana Stevens et Larson in Annal. Mycol. XXVI. p. 281 (1928).

Auf *Guioa* spec. mit schmalen Blättern; Philippinen; Luzon; Tarlac Prov.: La Paz, XII. 1924, leg. M. S. Clemens, Nr. 6373. — Auf einer *Guioa*-Art mit breiten Blättern. Luzon; Isabela Prov., XII. 1923, leg. M. S. Clemens, Nr. 2942.

Ob diese beiden *Guioa*-Kollektionen mit *M. Sydowiana* wirklich identisch sind, könnte mit Rücksicht darauf, dass die für sie vor allem in Betracht kommenden, auf Sapindaceen wachsenden Arten sich sehr nahe stehen, nur durch einen Vergleich mit den Originalkollektionen dieser Arten festgestellt werden. Die beiden auf *Guioa* bekannt gewordenen Arten *M. guioae* Hansf. und *M. guioae-semiglaucae* Hansf. sind sicher verschieden. Von anderen auf Sapindaceen lebenden Arten dürften wohl nur drei, nämlich *M. terecitensis* Hansf., *M. erioglossi* Stev. und *M. Sydowiana* Stev. et Lars. bezüglich eventueller Identität mit den beiden oben angeführten Kollektionen zu berücksichtigen sein. Von ihnen scheidet die an erster Stelle genannte Art aus, weil sie viel längere Myzelborsten und etwas grössere Sporen hat. Die beiden anderen Arten müssen sich, nach den Beschreibungen zu urteilen, sehr nahe stehen, wie aus der folgenden Gegenüberstellung der zur Unterscheidung wichtigsten Merkmale zu ersehen ist.

M. erioglossi, Borsten bis 340 ⇌ 7.5 μ, stumpf; Sporen 37—43 ⇌ 14—17 μ.

M. Sydowiana Borsten bis 240 ⇌ 8—9 μ, zugespitzt; Sporen 33—38 ⇌ 12—14.

Die beiden *Guioa*-Kollektionen haben teils stumpf zugespitzte, oben kaum heller gefärbte, teils stumpfe, oft mehr oder weniger abgestutzte, oben allmählich heller gefärbte, 160—250 ⇌ 8—10 μ grosse Borsten und 32—40—43 μ lange, 13—16 ⇌ 10—12 μ breite Sporen.

In bezug auf die Dimensionen der Borsten stimmen die *Gioa*-Pilze mit *M. Sydowiana,* in bezug auf die Sporengrösse dagegen mit *M. erioglossi* überein. Sehr charakteristisch sind die Hyphopodien, die so wie bei *M. Sydowiana* und *M. erioglossi* in bezug auf ihre Form ausserordentlich veränderlich sind. Man findet kaum zwei, die in bezug auf dieses Merkmal miteinander völlig übereinstimmen. Sie sind nämlich teils ganzrandig, dann zylindrisch, länglich eiförmig

oder keulig, gerade oder stark vorwärts gerichtet, oft fast geknickt und dann fast hammerförmig, teils stumpfeckig oder auch mit 1—2 stumpfen, unregelmäßig verteilten Läppchen versehen. In bezug auf dieses Merkmal der Hyphopodien stimmen die *Guioa*-Kollektionen mit *M. Sydowiana* besser überein, weshalb ich sie, zumal sie auch kürzere Borsten haben, mit dieser Art identifiziert habe.

Meliola symphonematis Petr. n. spec.

Plagulae epiphyllae, rarissime hypophyllae, irregulariter dispersae, tenues, canescentes, ambitu orbiculares sed plerumque plus minusve irregulares, distincte limitatae, 2—6 mm diam., interdum etiam multo majores et magnam folii partem occupantes; hyphae pellucide brunneae, crassiuscule tunicatae, saepe leniter undulatae, opposite ramosae et laxe reticulatae, 5—7 μ crassae; hyphopodia capitata alternata, plus minusve antrorsa vel subpatentia, 16—24 μ longa; cellula basali cylindracea, 3—6 ⇌ 4—6 μ; cellula apicali recta, integra, ellipsoidea vel oblongo-ovoidea, antice late rotundata, 10—14 ⇌ 8—10.5 μ; hyphopodia mucronata pauca, alternantia, raro opposita, anguste ampullacea, 18—21 ⇌ 5—6.5 μ; setae mycelicae subnumerosae, dispersae, e basi geniculata rectae, simplices, subarcuatae, raro irregulariter curvulae, paulatim attenuatae, obtusiusculae vel subacuminitae, 150—350 ⇌ 6—9 μ; perithecia irregulariter dispersa, globosa, 80—120 μ, raro usque ad 140 μ diam.; parietis membranacei cellulae irregulariter angulosae, tenuiter tunicatae, pellucide brunneae, 7—14 μ diam. metientes, in superficie vix prominulae; sporae oblongae vel anguste ellipsoideae, utrinque late rotundatae, vix vel leniter attenuatae, rectae, pellucide atro-brunneae, 4-septatae, vix vel lenissime constrictae, 26—33 ⇌ 12—14 ⇌ 8—10 μ.

Auf *Symphonema luzonicum;* Philippinen; Luzon; Pampanga Prov.: Porac, 30. X. 1923, leg. M. S. Clemens, Nr. 4667.

Dieser Pilz ist von allen bisher auf Proteaceen bekannt gewordenen Arten sicher verschieden und durch die kleinen Gehäuse und Sporen leicht zu unterscheiden. Er ist leider auf dem vorliegenden, zahlreichen Material durch verschiedene, parasitische Hyphomyzeten oft ganz verdorben.

Meliola tabernaemontanae Speg. in Anal. Mus. Nac. Buenos Aires XXIII. p. 42 (1912).

Auf *Tabernaemontana pandacaqui;* Philippinen; Luzon; Prov. Tarlac, I. 1925, leg. M. S. Clemens, Nr. 6588.

Rasen beiderseits, rundlich, oft mehr oder weniger unregelmässig, locker oder dicht zerstreut, 1—4 mm im Durchmesser. Hyphen schwarzbraun, 5—9 μ breit. Kopfförmige Hyphopodien sehr zahlreich, abwechselnd, mit 3—4 μ, selten bis 10 μ langer, nach unten oft mehr oder weniger verbreiterter Basalzelle und länglich eiförmiger, ellipsoidischer, oft etwas unregelmässiger, stark vorwärts ge-

krümmter Scheitelzelle; mukronate Hyphopodien ziemlich zahlreich, meist gegenständig, 15—18 μ lang, aus zylindrischer, ca. 4—6 μ breiter Basis nach oben allmählich verjüngt, am Ende abgestutzt. Myzelborsten ziemlich zahlreich, fast opak schwarzbraun, sich nach oben allmählich verjüngend und oft auch heller färbend, an der Spitze stumpf abgerundet oder fast zugespitzt, 200—600 ⇌ 8—10 μ; Perithezien 100—160 μ im Durchmesser. Peritheziummembran aus meist ca. 8—12 μ, seltener bis ca. 15 μ grossen, an der Oberfläche kaum vorspringenden Zellen bestehend. Sporen länglich, beidendig breit abgerundet, bisweilen auch etwas verjüngt, mit 4 Querwänden, an diesen meist ziemlich stark eingeschnürt, durchscheinend schwarzbraun, 33—38 ⇌ 12—16 ⇌ 10—12 μ.

Meliola telosmae Rehm in Philipp. Journ. Sci. C. Botany, VIII. p. 392 (1913).

Auf *Tylophora* spec. Philippinen; Luzon; Ilocos Prov.: Bauguen, V. 1925, leg. M. S. Clemens, Nr. 6711; Luzon: Tarlac Prov. III. 1923, leg. M. S. Clemens, Nr. 556. — Auf *Telosma* spec. Luzon; Pangasinan Prov.: Asingan, XI. 1923, leg. M. S. Clemens, Nr. 3110.

Diese drei Kollektionen stimmen völlig überein; die an zweiter Stelle genannte zeigt den Pilz aber nur in altem Zustande. Perithezien sind nur vereinzelt vorhanden, mehr oder weniger zerfallen und leer. Bei der zuerst genannten Kollektion sind die Myzelborsten meist bogig oder unregelmässig gekrümmt und bis ca. 250 μ lang. Perithezien 100—140 μ. Sporen 26—34 ⇌ 11—13 ⇌ 9—10 μ.

Meliola tenella Pat. in Rev. Mycol. X. p. 140 (1888).

Auf *Murraya ? exotica;* Philippinen; Luzon; Manila: Norte, XII. 1923, leg. M. S. Clemens, Nr. 3234.

Rasen mehr oder weniger rundlich, ziemlich scharf begrenzt, meist hypophyll, ca. 1—5 mm gross, oft genähert und mehr oder weniger zusammenfliessend, kohlschwarz. Hyphen gegenständig und sehr dicht netzartig verzweigt, mit den zahlreichen Hyphopodien zusammenhängende, oft nur sehr kleine Lücken frei lassende Häutchen bildend. Kopfförmige Hyphopodien abwechselnd, 20—26—30 μ lang. Basalzelle zylindrisch, 7—8 μ lang; Scheitelzelle keulig, ei- oder birnförmig, selten fast zylindrisch, oft mehr oder weniger gekrümmt, 15—20 ⇌ 8—11 μ; mukronate Hyphopodien wurden nicht gefunden, müssen daher nur sehr spärlich vorhanden sein. Myzelborsten 1—3-mal dichotom verzweigt; die Äste dritter Ordnung sind oft nur als kleine, ziemlich spitz kegelförmige, 2—3 ⇌ 1.5—2 μ grosse Papillen angedeutet. Perithezien 180—230 μ gross. Sporen länglich, beidendig breit abgerundet, kaum verjüngt, kaum oder nur sehr schwach eingeschnürt, 43—50 ⇌ 17.5—20 ⇌ 13—14.5 μ.

Meliola teramni Syd. in Annal. Mycol. XV. p. 193 (1917).

Auf *Teramnus labialis;* Philippinen; Luzon; Tarlac Prov.: Capas, 26. III. 1923, leg. M. S. Clemens, Nr. 537. — Auf einer

Leguminose, wahrscheinlich *Canavalia* spec. Luzon, Prov. Nueva Vizcaya: north of Bambang, I. 1924, leg. M. S. Clemens, Nr. 3436.

Die Kollektion auf *? Canavalia* weicht von dem Pilze auf *Teramnus* etwas ab und soll deshalb hier kurz beschrieben werden: Hyphen 6—9 μ breit, kastanienbraun. Myzelborsten bis ca. 1100 μ lang, 8—10 μ dick, die längeren meist sehr allmählich zugespitzt, die kürzeren meist abgestutzt und oft mit zwei ca. 3—5 μ langen, 2—3 μ breiten, stumpfen Zähnchen versehen. Kopfförmige Hyphopodien abwechselnd, mit kurz zylindrischer, 2—6 μ langer, 6—10 μ breiter Basalzelle und breit eiförmiger oder ellipsoidischer oft etwas unregelmässiger, 10—16 ⇌ 9—13 μ grosser, bisweilen in der Längsrichtung zusammengedrückter, dann bis ca. 18 μ breiter Scheitelzelle. Perithezien 130—160 μ im Durchmesser. Zellen der Membran 7—12—18 μ gross, aussen kaum oder nur sehr schwach vorspringend. Sporen länglich, beidendig sehr breit abgerundet, nicht oder nur schwach verjüngt, schwarzbraun, an den vier Querwänden mehr oder weniger, oft ziemlich stark eingeschnürt, 36—44—50 ⇌ 13—17 ⇌ 10—12 μ.

Meliola trachelospermi Yates in Philipp. Journ. Sci. C Botany XIII. p. 370 (1918).

Auf *Trachelospermum Vanoverberghii.* Philippinen; Luzon; Pampanga Prov.: Mt. Arayat, III. 1923, leg. M. S. Clemens, Nr. 635.

Auf dem spärlichen Material sind nur wenige Rasen vorhanden, die mit der Beschreibung so gut übereinstimmen, dass an der Identität nicht zu zweifeln ist. Die Borsten sind vereinzelt bis 480 μ lang.

Meliola viburni Syd. in Annal. Mycol. XV. p. 193 (1917).

Auf *Viburnum odoratissimum;* Philippinen; Luzon: Nueva Viscaya Prov.: Bambang, I. 1924, leg. M. S. Clemens, Nr. 3447.

Rasen nur epiphyll, ganz vereinzelt, sehr klein, oft fast ganz im Indument des Blattes mehr oder weniger verborgen und deshalb leicht zu übersehen. Hyphen 6—9 μ dick. Kopfförmige Hyphopodien abwechselnd, spärlich, 20—30 μ lang; Scheitelzelle ei- oder birnförmig, oft stumpfeckig, seltener undeutlich gelappt, 16—23 ⇌ 12—16 μ; Myzelborsten ganz vereinzelt, zuweilen auch ganz fehlend, einfach, stumpf zugespitzt, bis ca. 200 μ lang, 6—8 μ breit. Perithezien lockere Räschen bildend, 120—170 μ lang. Sporen länglich, beidendig breit abgerundet, kaum oder schwach verjüngt, durchscheinend schwarzbraun, mit 4 Querwänden, meist schwach eingeschnürt, 32—40—42 ⇌ 15—18 ⇌ 10—13 μ.

Dieser Pilz ist eine ausgesprochene Mittelform zwischen *Meliola* und *Asteridiella* und ein Beweis dafür, dass das Vorhandensein oder Fehlen der Myzelborsten als einziges Unterscheidungsmerkmal zwischen den genannten Gattungen keinen höheren Wert hat und eine Trennung derselben kaum rechtfertigt.

Meliola wikstroemiicola Hansf. in Sydowia XI. p. 62 (1958).

Auf *Wikstroemia* spec. Philippinen; Luzon; Bataan Prov.: Orani, V. 1923, leg. M. S. Clemens, Nr. 941.

Das Material dieser Kollektion ist zwar sehr zahlreich, zeigt den Pilz aber nur spärlich und meist in ganz altem Zustande. Er stimmt mit der Beschreibung des Autors gut überein und weicht davon, wie die folgende Beschreibung zeigt, nur unwesentlich ab.

Rasen beiderseits, häufig jedoch epiphyll, hier meist klein, rundlich oder unregelmässig, oft sehr zahlreich, dann zusammenfliessend und grössere Teile des Blattes überziehend, grauschwärzlich, ziemlich zart und unscharf begrenzt. Hyphen locker gegenständig oder unregelmässig verzweigt, meist gerade oder nur schwach wellig gekrümmt, schwarzbraun, 5—7 μ breit. Kopfförmige Hyphopodien abwechselnd, mehr oder weniger vorwärts gerichtet, mit zylindrischer oder gestutzt und verkehrt kegelförmiger, 2—6 μ langer, 4—6.5 μ breiter Stielzelle und ellipsoidischer oder eiförmiger, bisweilen etwas gekrümmter, 8—13.5 ⇌ 7—10 μ grosser Scheitelzelle; mukronate Hyphopodien ziemlich zahlreich, meist gegenständig, aus ca. 6—7.5 breiter Basis meist allmählich verjüngt, oft etwas vorwärts gerichtet, seltener aber auch mehr oder weniger stark gekrümmt, 18—22 μ lang. Myzelborsten meist gerade oder nur sehr schwach bogig gekrümmt, schwach und sehr allmählich verjüngt, stumpf, oft fast gestutzt abgerundet, fast opak schwarzbraun, bis ca. 500 μ lang, 7—9 μ breit. Perithezien sehr locker zerstreut, oft ganz vereinzelt, 140—200 μ gross. Sporen durchscheinend schwarzbraun, an den Querwänden meist ziemlich stark eingeschnürt, 30—36 ⇌ 13—14 ⇌ 11—12 μ.

Meliola wrightiae Yates in Philipp. Journ. Sci. C Botany XIII. p. 371 (1918).

Auf *Wrightia laniti.* Philippinen; Luzon; Bulacan Prov.: Calumpit, X. 1924, leg. M. S. Clemens, Nr. 6505.

Rasen nur epiphyll, zerstreut, unregelmässig, sehr zart. Perithezien 80—140 μ. Myzelborsten fast nur am Rande der Gehäuse, bogig gekrümmt, selten gerade, 90—180 ⇌ 6—7.5 μ. Sporen länglich oder fast zylindrisch, 24—30 ⇌ 12—14 ⇌ 8—10 μ.

Meliola Yatesiana Trott. in Sacc. Syll. XXIV. p. 284 (1926).

Auf *Diospyros maritima.* Philippinen; Luzon; Pangasinan Prov.: Anda, III. 1925, leg. M. S. Clemens, Nr. 6929.

Rasen beiderseits, meist jedoch epiphyll, unregelmässig, unscharf begrenzt, oft genähert und zusammenfliessend, einzeln meist 1—5 mm im Durchmesser. Hyphen dicht netzartig verzweigt, mehr oder weniger gekrümmt, 6—9 μ breit, Kopfförmige Hyphopodien gegenständig oder abwechselnd, 16—23 ⇌ 9—10 μ gross. Scheitelzelle meist mehr oder weniger zylindrisch, oben breit abgerundet oder

fast abgestutzt, seltener eiförmig oder ellipsoidisch, vereinzelt auch fast kugelig; mukronate Hyphopodien 15—20 ⇌ 9—10 μ, flaschenförmig. Myzelborsten spärlich, 300—600 ⇌ 9—11 μ. Perithezien sehr leicht abfallend, 160—200 μ im Durchmesser. Sporen länglich, beidendig sehr breit abgerundet, kaum verjüngt, schwarzbraun, mit 4 Querwänden, an diesen meist schwach eingeschnürt, 40—50 ⇌ 17—20 ⇌ 12—15 μ.

Dieser Pilz wurde von Hansford und Deighton in Mycol. Paper Imp. Mycol. Inst. Kew XXIII. p. 50 (1948) als Varietät von *M. diospyri* Syd. aufgefasst und *M. diospyri* var. *Yatesiana* (Trott.) Hansf. et Deighton genannt. Der Pilz weicht aber von *M. diospyri* durch die Form der Hyphopodien und durch die grösseren Sporen so ab, dass er wohl besser als besondere Art aufzufassen ist.

Meliola zambalesica Petr. n. spec.

Plagulae epiphyllae, rarissime hypophyllae, irregulariter laxe vel subdense dispersae, subvelutinae, ambitu orbiculares vel ellipticae, saepe plus minusve irregulares, indistincte limitatae, 1—3 mm diam. raro paulo majores; hyphae atro-brunneae, irregulariter laxe vel subdense reticulato-ramosae, crassiuscule tunicatae, rectae vel leniter undulato-curvulae, 7—10 μ, raro usque ad 13 μ crassae; hyphopodia capitata laxe distributa, alternata, plus minusve, plerumque valde antrorsa, 32—40 μ longa; cellula basali cylindracea vel obconica, 5—13 —16 ⇌ 6—10 μ; cellula apicali ovoidea vel piriformi, raro fere ellipsoidea, antice latissime rotundata, integra, raro in uno vel in utroque latere parum supra basin, raro in medio fere lobulo minuto, parum prominulo praedita, 19—27 ⇌ 15—20 μ; hyphopodia mucronata perrara, fere semper solitaria, e basi plus minusve inflata ampullacea vel lageniformia, 16—23 μ longa, postice 8—10 μ, antice ca. 3.5 μ lata; setae mycelicae laxe vel subdense dispersae, e basi plus minusve adunca erectae, continuae nec dentatae, paulatim attenuatae, antice subacuminatae vel late rotundatae, rectae vel parum arcuatae, fere opace atro-brunneae, 250—500 ⇌ 10—13 μ; perithecia laxe dispersa, saepe solitaria, facillime decidua, globosa, 110—180 μ diam.; cellulae parietis membranacei exteriores leniter tantum, rarissime usque ad 40 μ prominulae; sporae oblongae vel anguste ellipsoideae, utrinque late rotundatae, vix vel lenissime attenuatae, pellucide atro-olivaceae, 4-septatae, vix vel parum constrictae, 44—55 ⇌ 17—20 ⇌ 13—15 μ.

Auf *Dioscorea* spec.; Philippinen; Luzon; Zambales Prov.: Olongapo, III. 1924, leg. M. S. Clemens, Nr. 2474.

Von den bisher auf *Dioscorea* bekannt gewordenen *Meliola*-Arten lässt sich der hier beschriebene Pilz schon durch die stets einfachen, stumpf zugespizten oder abgestutzten, niemals gezähnten oder gabelästigen Myzelborsten, grössere Hyphopodien und etwas grössere Sporen leicht unterscheiden.

Versuche zur Frischerhaltung der Milch unter klimatisch ungünstigen Bedingungen.

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Vorstand: Dr. Mustafa Selli.

Wenn in den Balkanländern und im ganzen Orient immer wieder die Frage nach einer Möglichkeit des Frischerhaltens der Milch für die Zeit des Transportes gestellt wird, so geschieht dies aus der dringenden Notwendigkeit, weil die Milch häufig schon auf dem Wege zur Molkerei gerinnt. Der Weg nimmt oft viele Stunden in Anspruch bei ungünstigsten Temperaturen und Transportmitteln. Daher ist das Problem des Haltbarmachens der Milch sowohl für den Bauern als auch für die Milchverwertungsstellen des Orients ein wichtiges. Es sollte also eine konservierende Substanz gefunden werden, die die normale Bakterienflora der Milch nicht tötet, sondern lediglich das Wachstum der Keime für 24 Stunden auch unter besonderen Umweltbedingungen unterdrückt, weil sie bis zu diesem Zeitpunkt sicherlich am Orte der Pasteurisierung und Weiterverarbeitung angelangt ist. Schliesslich soll die auf diese Weise vorbehandelte Milch noch zur Verarbeitung zu Milchprodukten geeignet sein.

Es ist nicht sehr schwierig, bei festen Substanzen, die für den menschlichen Genuss bestimmt sind, die Frischerhaltung zu verlängern, wo doch manchmal schon eine keimfreie, luftdicht abgeschlossene Verpackung genügt, die Haltbarkeit der Nahrungsmittel um ein Vielfaches zu verlängern.

Anders verhält es sich mit flüssigen Nahrungsmitteln, wobei der Milch als Nahrungsmittel wohl die grösste Bedeutung zukommt. Wenn man bedenkt, dass der konservierende Faktor in der Milch zur Gänze und meist ohne vorheriges Kochen in den Verdauungstrakt aufgenommen wird, die Milch aber für den Säugling und das Kleinkind fast ausschliessliche Nahrung ist, muss die Unschädlichkeit dieser Substanz wohl garantiert sein. Ebensowenig darf durch Zusatz einer noch so unschädlichen Konservierungssubstanz eine Geschmacksveränderung eintreten. Aus diesen Überlegungen heraus musste die Versuchsreihe angestellt werden.

Material und Methoden:

Augenmerk wurde hauptsächlich auf Substanzen gelegt, die als Bakterien-Inhibitoren bekannt sind. Dass einige von ihnen auch fungistatische Wirkung besitzen, ist zwar bekannt, wurde aber für diese

Versuchsreihe nicht ausgewertet, weil für die ersten 24 Stunden Frischerhaltung der Milch Keime, wie Hefen und Schimmelpilze, als zerstörende Faktoren auch in den klimatisch ungünstigsten Gegenden nicht in Frage kommen.

Zuerst wurden Substanzen zum Versuch herangezogen, die sich als „duldbare Konservierungsmittel" (K. Lang) für kohlehydrat-, fett- und eiweisshaltige Lebensmittel seit langem bewährt haben: Benzoesäure, Sorbinsäure und deren Na-Salze (J. J. Deuel u. M. A., M. v. Schelhorn). Die geschmackliche Grenze wird für andere Nahrungsprodukte allerdings mit einer höheren Konzentration angegeben (M. v. Schelhorn), als wir für die Milch feststellen konnten.

Weiters wurde auch Vioform untersucht, von dem wir aus eigenen Untersuchungen wissen, dass es die obligate Darmflora in den üblichen Dosen nicht beeinflusst. Leider ist die Substanz fast nicht löslich. Wir setzten sie daher in Form aufgelöster Tabletten zu, weil diesem noch ein oral verträgliches Netzmittel beigegeben ist, das eine stärkere Verteilung der Substanz bewirkt.

Meerrettich oder Kren (Radix armoraciae) ist für die europäische Hausfrau ein bekannter Faktor zur längeren Frischerhaltung der Milch. Er wird üblicherweise in Form von Scheiben der Milch zugesetzt und bewirkt tatsächlich bei günstiger Lagerung eine Wachstumshemmung und Hemmung des Stoffwechsels der milchsäuernden Bakterien, ohne eine Geschmacksveränderung zu verursachen. Bei Versuchen, die die ungünstigen klimatischen Bedingungen des Orients reproduzieren sollten, bewährte sich allerdings weder diese Methode noch der Zusatz des Pressaftes dieser Pflanze in Konzentrationen, die den Geschmack nicht beeinträchtigen.

Und schliesslich interessierte uns die Wirkung der Antibiotika — hauptsächlich Breitbandantibiotika — auf die Keime der Milch. Antibiotika sind in der Nahrungsmittelindustrie seit Jahren gebräuchlich, zum Teil ein umstrittenes Kapitel, doch werden sie, wie der letzte Biochemiker-Kongress (Wien, September 1958) zeigte, heute vom Grossteil der Fachexperten akzeptiert.

H. Mooser stellte 5 Punkte für die Fütterung und Konservierung auf, die bei Verwendung von Penicillin für die Milch, aber auch von Tetracyklinen beachtet werden müssten:

1. Die direkte toxische Wirkung,
2. die Sensibilisierung der Antibiotika,
3. Allergische Reaktionen bei sensibilisierten Personen,
4. das Auftreten resistenter Keime,
5. Veränderung der Mund- und Darmflora.

Schliesslich betont J. Kühnau noch die Möglichkeit der Wirkung von Abbauprodukten der Antibiotika, die nicht mit den üblichen

mikrobiologischen Methoden nachweisbar sind. Dieser Punkt scheint uns fast noch wichtiger als die oben beschriebenen, weil die Wirkung der Abbauprodukte vielleicht auf lange Sicht irgendwelche Schädigungen hervorrufen könnte. Es müsste also der Kliniker nach langdauernden In-vivo-Versuchen dazu Stellung nehmen.

Die Frage der Resistenzerzeugung von pathogenen Keimen durch stetige unterschwellige Werte bleibt natürlich bestehen, doch scheinen wir diese Zweifel nach eingehenden Untersuchungen ausschalten zu können. Mit Hilfe der Hemmhofmethode und der Verdünnungsreihe mit *Bacillus cereus* (L. Hallmann, P. Klein, H. Vonderbank) nach vorheriger Ausschaltung der Milchkeime (H. Schirmer) gelang es, den Abbau des in nur geringen Mengen in der Milch enthaltenen Antibioticums festzustellen, so dass nach 24-stündiger Einwirkungsdauer bei verschiedenen Temperaturen gleich und nach darauffolgender Pasteurisierung keine biologisch messbaren Werte der in Frage kommenden Antibiotika diagnostiziert werden konnten. Als unbrauchbar — trotz Frischerhaltens der Milch und trotz Abbaues in der Milch — mussten jene Antibiotika angesehen werden, die auch bei gerade noch wirksamer Dosierung eine Geschmacksveränderung des Nahrungsmittels herbeiführten, z. B. Bacithracin, Erycin. Zur engeren Wahl blieben also lediglich die Tetracykline Terramycin und Aureomycin, und Chloromycetin (Chloramphenicol).

Anfänglich arbeiteten wir mit Molkereimilch, später mit Sammelmilch, die wir von der Molkerei vor jeder Bearbeitung erhielten.

Die gewonnenen Substanzen wurden in möglichst wenig Wasser gelöst, der Milch zugesetzt und für jede Dosierung 4 Parallele aufgestellt, wobei je ein Kölbchen bei + 4° C, bei Zimmertemperatur, bei 28° C und bei 37° C für 24 Stunden verblieben (die Zimmertemperatur im Labor schwankte zur Zeit der Versuchsanstellung von 37° C in den Mittagsstunden bis 16° C in der Nachtzeit). Ebenso wurde eine Kontrolle ohne konservierenden Zusatz zu allen Versuchstemperaturen aufgestellt.

Nach 24 Stunden wurden die Proben von mehreren Versuchspersonen auf ihren Geschmack geprüft, wobei wir unterschieden: süss, sauer, Joghurt und Geschmacksveränderung. Vor der Geschmacksprobe wurden alle Milchsorten auf gleiche, zum Trinken angenehme Temperatur gebracht.

Die Ergebnisse sind in den Tabellen festgehalten.

Wie aus den Tabellen ersichtlich, liefert Terramycin die günstigsten Ergebnisse. Wir wiederholten die Versuche mit verschiedenen Milchsorten, wobei die Resultate die gleichen blieben.

Bei allen übrigen ausgetesteten konservierenden Substanzen ist der Abstand zwischen süss und Geschmacksveränderung so gering

Tabelle I.

Konservierende Substanz	Konzentration	Ergebnis nach 24stündiger Einwirkungsdauer bei +4°	Zimmertemperatur	+ 28°	+ 37°
Benzoesäure	0,05%	G.Ver.*) süss	G.Ver. süss	G.Ver. süss	G.Ver. süss
	0,02%	G.Ver. süss	G.Ver. sauer	G.Ver. sauer	G.Ver. sauer
Sorbinsäure	0,05%	G.Ver. süss	G.Ver. süss	G.Ver. süss	G.Ver. süss
	0,02%	G.Ver. süss	G.Ver. süss	G.Ver. süss	G.Ver. süss
Na-Benzoat	0,05%	G.Ver. süss	G.Ver. süss	G.Ver. Joghurt	G.Ver. Joghurt
Na-Sorbinat	0,05%	G.Ver. süss	G.Ver. süss	G.Ver. süss	G.Ver. sauer
Radix armoraciae (in Scheiben)	5%	süss	Joghurt	sauer Joghurt	sauer Joghurt
	20%	G.Ver. süss	G.Ver. Joghurt	G.Ver. Joghurt	G.Ver. sauer
Radix armoraciae	0,1%	süss	Joghurt	Joghurt	Joghurt sauer
(Pressaft)	1,0%	G.Ver. süss	G.Ver. Joghurt	G.Ver. sauer	G.Ver. sauer
Vioform	0,1%	süss	G.Ver. Joghurt	G.Ver. Joghurt	G.Ver. Joghurt
	0,01%	süss	Joghurt	Joghurt	Joghurt sauer

oder es trat die Geschmacksveränderung schon mit den Unterscheidungsmerkmalen „sauer“ und „Joghurt“ auf, dass diese zur praktischen Anwendung der Frischerhaltung der Milch nicht mehr in Frage kommen.

Einer mit Joghurt-Keimen beimpften Milch wurde ebenfalls Terramycin zugesetzt, wobei Konzentrationen von 1,25 γ/ml bis 5,0 γ/ml keinerlei Hemmung der Joghurtbildung verursachten, aber auch den Geschmack nicht beeinflussten. Nach 48-stündiger Bebrütung bei 37° C trat kein „Sauerwerden“ der Joghurt ein.

*) G.Ver. = Geschmacksveränderung.

Tabelle II.

Antibioticum	Konzentration	Ergebnis nach 24stündiger Einwirkungszeit bei + 4° C	Zimmertemperatur	+ 28° C	+ 37° C
Terramycin	10 γ/ml	süss	G.Ver. süss	süss	G.Ver. süss
	5 γ/ml	süss	süss	süss	süss
	2,5 γ/ml	süss	süss	süss	süss
	1,25 γ/ml	süss	süss	süss	süss
	0,625 γ/ml	süss	Joghurt	Joghurt	Joghurt
Aureomycin	10 γ/ml	G.Ver. süss	G.Ver. süss	G.Ver. süss	G.Ver. süss
	5 γ/ml	G.Ver. süss	G.Ver. süss	G.Ver. süss	G.Ver. süss
	2,5 γ/ml	süss	süss	süss	sauer
	1,25 γ/ml	süss	Joghurt	sauer	sauer
	0,625 γ/ml	süss	Joghurt sauer	Joghurt sauer	sauer
Chloromycetin	10 γ/ml	G.Ver. süss	G.Ver. süss	G.Ver. süss	G.Ver. süss
	5 γ/ml	G.Ver. süss	G.Ver. süss	G.Ver. süss	G.Ver. süss
	2,5 γ/ml	süss	süss	süss	G.Ver. süss
	1,25 γ/ml	süss	Joghurt	sauer	sauer Joghurt
	0,625 γ/ml	süss	Joghurt	Joghurt sauer	Joghurt sauer
Kontrolle ohne Antibioticum		süss	sauer	sauer	sauer

Diskussion:

Für die Milchflora in den österreichischen Gebieten genügt eine Dosierung von 1,25 γ Terramycin/ml Milch. Für die wahrscheinlich quantitativ und qualitativ reichere Bakterienflora des Orients wird voraussichtlich eine etwas höhere Dosierung notwendig sein. Da nach unseren Versuchen die Konzentration bis auf 5 γ/ml erhöht werden kann, ohne dass die Milch eine Geschmackseinbusse erfährt und nach 24-stündiger Einwirkungsdauer auch keine biologisch mess-

baren Antibiotikamengen in der Milch *) nachweisbar sind, müsste der Versuch in diesen Ländern reproduziert werden.

Es bleibt nun dem Kliniker überlassen, den Wert dieser In-vitro-Untersuchungen durch grosse Reihen von Verträglichkeitsprüfungen zu kontrollieren, wenngleich nach unseren Resultaten das Terramycin nach 24 Stunden schon nicht mehr als Antibiotikum, sondern höchstens als Abbauprodukt in den menschlichen Verdauungstrakt gelangt. Eben aber die Funktion dieser Abbauprodukte verdient das Interesse der Kliniker, weil über sie noch äusserst wenig bekannt ist.

Ebenso wäre noch die Preisfrage zu diskutieren und die Frage der praktischen Handhabung, damit jeder Bauer ohne Schwierigkeiten in die entsprechende Milchmenge die richtige Konzentration des Antibiotikums verabreicht.

Zusammenfassung:

Es wurden Versuche mit Rohmilch (pasteurisiert und unpasteurisiert) angestellt unter ungünstigen klimatischen Bedingungen, wie sie in den Balkanländern und im Orient herrschen.

Als konservierende Substanzen wurden ausgetestet: Benzoesäure, Sorbinsäure und deren Na-Salze, Radix armoraciae in Form von Scheiben und Pressaft, Vioform und eine Reihe Breitbandantibiotika.

Lediglich Terramycin in einer Konzentration von 1,25 γ/ml bis 5,0 γ/ml verhindert in der Milch in den ersten 24 Stunden das Wachstum milchsäuernder Bakterien bei ungünstigen Temperaturen, ohne dass eine Geschmackseinbusse des Nahrungsmittels festzustellen wäre.

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*) Mit Ausnahme der N°C-Serie.

Beiträge zur Kenntnis einiger Asterineen der Philippinen.

Von F. Petrak (Wien).

Asterina antidesmatis Petr. n. spec.

Plagulae hypophyllae, minores ambitu orbiculares vel ellipticae, majores omnino irregulares, saepe a folii margine oriundae et magnam eius partem occupantes, tenues, griseo-brunnescentes; hyphae irregulariter et laxe reticulato-ramosae, plus minusve undulatae vel curvulae; raro rectiusculae, 3.5—4.5 μ latae, pellucide olivaceae, tenuiter tunicatae, subremote septatae; hyphopodia alternantia, rara, unicellularia, 6—7.5 ⇌ 6—12 μ, irregulariter 2—3- raro 4-lobulata, lobulis minutis, obtusis plus minusve divergentibus; ascomata laxe et irregulariter dispersa, ambitu orbicularia vel late elliptica, plus minusve sinuosa et obtuse angulosa, tunc saepe valde irregularia, 100—170 μ diam., omnino clausa, in maturitate e centro lobis subnumerosis dilabentia, postea fere usque ad marginem aperta; strato tegente ex hyphis radiatim contextis, rectiusculis, 3—4 μ, raro usque ad 4.5 μ latis, pellucide et sat pallide rufo-brunneis, breviter articulatis composito; asci pauci, raro plus quam 12 in quoque ascomate, globosi, late ellipsoidei vel ovoidei, sessiles, crasse tunicati, 8-spori, 36—45 ⇌ 30—40 μ; sporae conglobatae oblongae vel clavato-oblongae, utrinque late rotundatae, non vel postice tantum lenissime attenuatae, rectae, raro inaequilaterae, medio septatae et plus minusve constrictae, atro-brunneae, 20—24 ⇌ 9—11 μ; paraphysoides paucae, indistincte fibrosae, mox viescentes et mucosae.

Auf *Antidesma pentandrum*. Luzon, Pampanga Prov., Mt. Arayat, III. 1923, Nr. 653 *).

Das reichlich vorliegende Material dieses Pilzes zeigt ihn nur spärlich, jung und oft auch durch einen völlig sterilen Parasiten verdorben. Gut entwickelte Sporen konnten nur wenige gefunden werden, weshalb die darauf bezüglichen Angaben vielleicht noch zu berichtigen sein werden. Der Pilz ist durch die einzelligen, sehr unregelmässig gelappten Hyphopodien und durch die rost- oder ockerbraune Farbe der nur aus einer einzigen, radiären Hyphenschichte bestehenden Deckschicht auffällig und gut charakterisiert.

Asterina australiensis Syd. in Annal. Mycol. XXXV. p. 35 (1937).

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*) Alle hier aufgezählten Pilze wurden von Mrs. M. S. Clemens auf den Philippinen gesammelt.

Auf *Drimys piperata*. Mindanao; Davao Prov.: Mt. Apo, 5. VI. 1924. Nr. 2086.

Weicht von der Beschreibung durch die nur epiphyll auftretenden Myzelrasen, derbwandige, bis ca. 7.5 μ breite Hyphen und grössere, 24—32 μ lange, 11—15 μ breite Sporen ab. Die Oberzelle ist auch hier um ca. 2 μ breiter als die Unterzelle. Weil die mir vorliegende Kollektion sonst gut mit dem australischen Pilze übereinstimmt, wird sie wohl als eine etwas abweichende Form der von S y d o w beschriebenen Art zu betrachten sein.

A s t e r i n a d i t i s s i m a Syd. in Annal. Mycol. XV. p. 243 (1917).

Auf *Eugenia* spec. Luzon; Zambales Prov.: Olongapo, III. 1924, leg. M. S. C l e m e n s, Nr. 2460. — Auf *Eugenia* spec. Luzon; Rizal Prov.: Bosoboso, II. 1924, Nr. 2739.

Bei Nr. 2460 sind epiphyll 2—6 mm grosse, mehr oder weniger rundliche, sehr unscharf begrenzte, äusserst zarte Myzelrasen vorhanden, während hypophyll so wie bei Nr. 2739 die Fruchtgehäuse etwas lockerer, dafür aber über mehr oder weniger grosse Teile der Blattfläche zerstreut sind. Myzelhyphen sehr locker netzartig verzweigt, auch unter scharfer Lupe kaum zu erkennen, dickwandig, dunkel schwarzbraun, 5—6.5 μ breit. Hyphopodien abwechselnd, mehr oder weniger spärlich, kurz zylindrisch oder stumpf konisch, selten fast halbkugelig, einzellig, 10—14 μ, vereinzelt bis 17 μ lang, 6.5—9.5 μ breit. Fruchtgehäuse mehr oder weniger rundlich oder breit ellipsoidisch, mit schmalem, mehr oder weniger breit gelapptem und buchtigem, 20—45 μ breitem, sterilem Rand. Deckschicht radiär, aus 3—4 μ breiten, ziemlich kurzgliederigen, schwarzbraunen Hyphen bestehend. Aszi breit ellipsoidisch oder länglich eiförmig, 50—60 ⇌ 22—30 μ. Sporen länglich, beidendig breit abgerundet, schwach, aber meist deutlich verjüngt, 22—26 ⇌ 9—11 μ. Paraphysoiden ziemlich zahlreich, undeutlich faserig.

Ein mir vorliegendes Originalexemplar der *A. ditissima* stimmt mit den beiden oben genannten Kollektionen in vieler Hinsicht völlig überein, hat aber zahlreichere und kürzere, meist halbkugelige oder sehr kurz zylindrische Hyphopodien. In bezug auf die Form der Hyphopodien stimmt ein mir vorliegendes als *A. eugeniae* Yates bezeichnetes Exemplar von M. R a m o s und D. D e r o y, Nr. 22.678, genau überein. Trotzdem glaube ich, dass *A. ditissima* Syd. und *A. eugeniae* Yates nur Formen einer Art sein können, die *A. ditissima* Syd. zu heissen hat. Die Untersuchung zahlreicher Rasen hat mir nämlich gezeigt, dass bei den Formen mit längeren, zylindrischen oder stumpf konischen Hyphopodien ganz vereinzelt auch halbkugelige vorkommen, die der *A. ditissima* genau entsprechen. Deshalb müssen *A. eugeniae* Yates und *Parasterina eugeniae* (Yates) Mendoza als Synonyme von *A. ditissima* Syd. bezeichnet werden.

Asterina escharoides Syd. in Leafl. Philipp. Bot. IV. p. 1155 (1911).

Auf *Quisqualis indica*. Luzon; Isabela Prov. XII. 1923, leg. M. S. Clemens Nr. 2925.

Von dieser Art hat der Autor in Philipp. Journ. Sci. C. Botany VIII. p. 489 (1913) noch eine zweite Beschreibung mitgeteilt, mit welcher der vorliegende Pilz gut übereinstimmt. Die jungen Aszi sind mehr oder weniger kugelig und haben einen Durchmesser von ca. 33 µ. Die wenigen, reifen Sporen, die gefunden wurden, waren dunkel olivbraun, 14—18 ⇌ 8—10 µ gross und hatten ein sehr dicht feinkörnig rauhes Epispor.

Asterina nyanzae Hansf. in Annal. Mycol. XXXVI. p. 195 (1938).

Auf *Grewia* spec. Luzon; Nueva Viscaya Prov.; Bambang, I. 1924, Nr. 3433.

Rasen mehr oder weniger weit ausgebreitet, unregelmässig oft die ganze Blattfläche überziehend. Hyphen 3.5—5 µ breit. Hyphopodien 4.5—7 µ lang, 8—11 µ breit, einzellig, polsterförmig, unregelmässig und klein, 3—4-, selten undeutlich 5-lappig. Fruchtgehäuse 90—140 µ im Durchmesser. Aszi breit eiförmig oder kugelig, 28—40 µ gross. Sporen 16—22 ⇌ 9—11.5 µ, mit sehr feinkörnig rauhem Epispor.

Der reichlich vorliegende Pilz ist meist von einer schlecht entwickelten Dimeriee befallen und mehr oder weniger verdorben. Die Fruchtgehäuse sind entweder leer oder enthalten nur eine verschrumpfte Fruchtschicht, in der einzelne Sporen herumliegen. Die Aszi sind entweder ganz verschrumpft oder völlig aufgelöst und nur selten noch deutlich zu erkennen. In gut entwickeltem Zustande werden sie wohl noch etwas grösser als oben angegeben sein.

Auf einer anderen *Grewia*-Art, die fraglich als *G. multiflora* bezeichnet wird, liegt eine, leider auch sehr schlecht entwickelte *Asterina* vor, die der oben genannten Art in vieler Hinsicht nahe steht, aber doch etwas abweicht. Ob sie nur als eine Form der *A. nyanzae* oder als davon verschieden zu erachten ist, lässt sich nach dem schlechten Material nicht sicher entscheiden. Die Hyphen sind etwas schmäler, die Hyphopodien meist etwas höher, die Gehäuse kleiner. Die nur ca. 14—17 ⇌ 8—10 µ grossen Sporen sind wohl noch nicht ganz reif, durchscheinend olivbraun und haben ein deutlich sichtbares, nicht feinkörnig rauhes Epispor. Die reichlich vorhandene Konidienform wird unten als *Asterostomella grewiae* n. spec. beschrieben.

Asterina menispermacearum Petr. n. spec.

Plagulae epiphyllae, primo laxe dispersae, ambitu orbiculares vel late ellipticae, saepe irregulares, indistincte limitatae, 1—3 mm diam..

postea numerosae, plus minusve confluentes et magnam folii partem occupantes, ob ascomata dense gregaria minute verruculosae et atrae; hyphae irregulariter vel opposite et laxe reticulato-ramosae, rectiusculae vel leniter undulatae, 4.5—6 μ crassae, subremote septatae, crassiuscule tunicatae, pellucide atro-brunneae; hyphopodia rara, alternantia vel unilateralia, ovoidea ellipsoidea vel subglobosa, unicellularia, antice late rotundata, raro lenissime sinuosa, 7—11 ⇌ 6—10 μ; ascomata gregaria, raro solitaria, plerumque bina complurave aggregata et connata sed raro confluentia, ambitu orbicularia vel late elliptica, interdum obtuse angulosa et tunc plus minusve irregularia, 50—80 μ, raro usque ad 100 μ diam., primo clausa, mox lobis compluribus anguste triangularibus stellatim dehiscentia et plerumque usque ad marginem aperta; strato basali ca. 5—10 μ crasso, pseudoparenchymatico e cellulis rotundato-angulosis, subhyalinis vel pallidissime griseo-brunneolis, 3—4 μ diam., metientibus, mox viescentibus vel mucosis et tunc indistinctis composito; strato tegente radiatim contexto, ex hyphis medio fere opace atro-brunneis, marginem versus paulatim coeruleo-nigrescentibus, 3.5—5 μ, raro usque ad 5.5 μ latis, crassiuscule tunicatis composito; asci pauci, late ovoidei, ellipsoidei vel subglobosi, antice latissime rotundati, postice interdum instar stipitis abruptiuscule contracti, crasse tunicati, 8-spori, 23—34 ⇌ 17—30 μ, muco tenaci pallide griseo-coeruleo induti; sporae conglobatae, oblongae, utrinque late rotundatae, non vel postice tantum lenissime attenuatae, rectae, raro inaequilaterae, medio septatae, plus minusve constrictae, pellucide coeruleo-nigrescentes, 13.5—17 ⇌ 6—8.5 μ, episporio ca. 0.5 μ crasso, minutissime verruculoso-punctulato.

Auf einer Menispermacee. Luzon; Pampanga Prov.; Mt. Arayat X. 1925, Nr. 7057.

Ich war zuerst geneigt, den mir vorliegenden, prächtig entwickelten Pilz mit *A. tinosporae* Hansf. in Reinwardtia III. p. 137 (1954) zu identifizieren, mit der er in vieler Hinsicht gut übereinstimmt. H a n s f o r d erwähnt aber in seiner Beschreibung die eigenartige und auffällige Färbung der Deckschicht nicht, die in der Mitte fast opak schwarzbraun ist, sich aber gegen den Rand hin rasch dunkel tintenblau oder blauschwarz verfärbt. Auch die zähe, nach aussen ziemlich scharf begrenzte, unten hell tinten- oder graublaue, oben subhyalin werdende, paraphysoide Schleimmasse wird vom Autor nicht erwähnt. Die Hyphopodien der *A. tinosporae* sollen auch „varie lobata" sein, während sie am vorliegenden Pilze stets breit eiförmig, ellipsoidisch oder fast kugelig und nur ganz vereinzelt vorne sehr flach eingedrückt erscheinen. Deshalb glaube ich, dass *A. menispermacearum* als eine mit *A. tinosporae* wohl nahe verwandte, davon aber hinreichend verschiedene Art aufgefasst werden muss.

Ein sehr ähnlicher, die charakteristische graublaue Färbung zeigender Pilz ist *A. pusilla* Syd., der aber schon habituell durch die

äusserst zarten, auch unter der Lupe nur schwer erkennbaren Rasen, etwas kleinere Gehäuse, grössere Sporen, ganz besonders aber durch flache, fast immer 2—3-lappige Hyphopodien verschieden ist.

Asterina pemphidioides Cke. in Grevillea V. p. 16 (1876).

Auf *Eugenia* spec., Luzon; Ilocos Sur Prov. V—VI. 1925, Nr. 6613.

Auf die bei der Bestimmung der auf *Eugenia* und anderen Myrtazeen wachsenden Asterineen auftretenden Schwierigkeiten hat kürzlich auch Hansford in Reinwardtia III. p. 140—144 (1954) hingewiesen. Sie sind vor allem darauf zurückzuführen, dass auf den genannten Nährpflanzen zahlreiche, einander nahe stehende, je nach Standort und Matrix veränderliche Arten vorkommen. Dazu kommt noch, dass der grösste Teil dieser in den Herbarien befindlichen Pilze sehr schlecht entwickelt ist. Die meisten Exemplare sind ganz alt und enthalten dann keine Spur einer Fruchtschicht; andere sind wieder ganz jung und zeigen nur unreife Aszi ohne oder mit unreifen, meist ganz verschrumpften Sporen. Oft sind diese Pilze auch von Parasiten, besonders von Dimerieen, verschiedenen Hyphomyzeten oder Chaetothyrieen befallen und verdorben.

Die oben genannte Kollektion ist auch sehr schlecht entwickelt, teils alt, teils unreif, entspricht aber in bezug auf die Beschaffenheit des Myzels und der Gehäuse der von Theissen in Abh. Zool. Bot. Ges. VII./3. p. 40 (1913) mitgeteilten Beschreibung sehr gut und dürfte wohl identisch sein. Andere, ebenfalls nur alte oder unreife Asterineen zeigende Exemplare der von Mrs. Clemens gesammelten Pilze sind von der oben angeführten Kollektion verschieden, lassen sich aber nicht sicher beurteilen und müssen übergangen werden. Erwähnt sei noch, dass der von Sydow in Fungi exotici unter Nr. 270 als *A. pemphidioides* ausgegebene Pilz gewiss nicht diese Art, sondern eine *Lembosia* ist.

Asterina pogostemonis Petr. n. spec.

Plagulae epiphyllae, irregulariter et laxe dispersae, saepe solitariae, ambitu orbiculares vel ellipticae, plerumque irregulares, sub folii indumento occultatae, propterea vix visibiles, nigrescentes, 1—3 mm diam.; hyphae laxe reticulato-ramosae, plus minusve undulatae, raro rectiusculae, pellucide olivaceae, remote septatae, 3.5—4.5 μ latae; hyphopodia rara, alternantia, bicellularia, cellula basali breviter cylindracea, 3—3.5 μ longa, 3.5—4.5 μ lata; cellula apicali plus minusve depressa, 5—7 ⇌ 6—10 μ, irregulariter 2—3-lobulata, lobulis plus minusve hemisphaericis, 3—3.5 μ latis; ascomata laxe dispersa, ambitu orbicularia vel late elliptica, saepe obtuse angulosa, tunc plus minusve irregularia, 90—130 μ diam., primo clausa, mox lobis nonnullis triangularibus stellatim dehiscentia, postea late, saepe usque ad marginem aperta; strato basali tenuiter membranaceo, hyalino vel

subhyalino, indistincte fibroso; strato tegente radiatim ex hyphis 3—4 μ latis, breviter articulatis, pellucide atro-brunneis contexto; asci pauci, late ovoidei, ellipsoidei vel subglobosi, utrinque latissime rotundati vel postice abruptiuscule contracti, crasse tunicati, 8-spori, 24—33 ⇌ 18—26 μ; sporae conglobatae, oblongae vel ellipsoideae, utrinque late rotundatae, non vel postice tantum lenissime attenuatae, rectae, raro inaequilaterae, medio septatae, plus minusve constrictae, pellucide atro-brunneae, 14—18 ⇌ 8—10 μ, episporio levi, ca. 0.5 μ crasso; paraphysoides paucae, indistincte fibrosae, mox viescentes et mucosae.

Auf *Pogostemon velatus*. Luzon, Benguet Prov., Mt. Santo Tomas, 19. II. 1925, Nr. 5841.

Die Myzelrasen sind unter dem überaus dichten Indument verborgen und deshalb meist erst dann deutlicher zu sehen, wenn die Blätter abzusterben beginnen und sich dabei hell gelbbraun oder ockerbraun verfärben.

Asterina porriginosa Syd. in Leafl. Philipp. Bot. V. p. 1541 (1912).

Auf *Ilex crenata* f. *luzonica*. Luzon; Benguet Prov. Mt. Pulog and vicinity, 24.—27. II. 1925, Nr. 6283 pp.

Das vorliegende, ziemlich zahlreiche Material zeigt den Pilz und die weiter unten erwähnte *Asterinella* nur sehr spärlich. Davon abgesehen, ist besonders die stets epiphyll auftretende *Asterina* von verschiedenen Parasiten, meist von einer Dimeriee befallen und mehr oder weniger, oft ganz verdorben; nur wenige besser entwickelte Fruchtgehäuse wurden gefunden, die mit Sydow's Beschreibung sehr gut übereinstimmen und die Identität mit *A. porriginosa* nicht zweifelhaft erscheinen lassen. Myzelhyphen sehr locker verzweigt, 5—6 μ breit. Hyphopodien abwechselnd, kurz zylindrisch, selten etwas keulig, 13—16 μ lang, 6—10 μ breit. Fruchtgehäuse locker zerstreut, im Umriss meist ganz unregelmässig eckig, oft etwas buchtig und gelappt, ca. 180—200 μ gross. Aszi breit eiförmig oder fast kugelig, 50—60 ⇌ 40—55 μ, in einer zäh schleimigen, hell gelbbräunlichen, undeutlich faserigen Masse steckend. Sporen länglich, in reifem Zustande fast opak schwarzbraun, 20—30 ⇌ 10—15 μ.

Asterina pusilla Syd. in Philipp. Journ. Sci. C Botany VIII. p. 488 (1913).

Auf *Premna ? odorata*. Luzon; Bulacan Prov.: Santa Maria, XI. 1924, Nr. 6067. — Auf *Premna* spec. Luzon: Nueva Viscaya Prov.: Bambang, I. 1924, Nr. 4407.

Diese beiden Kollektionen stimmen mit Sydow's Beschreibung gut überein. Der genannte Autor hat aber in seiner Diagnose ein auffälliges, für diese Art gewiss sehr charakteristisches Merkmal nicht erwähnt. Die Basalschicht und der paraphysoide Schleim sind näm-

lich, so wie oben schon für *A. menispermacearum* angegeben wurde, schön tintenblau gefärbt.

Asterina rizalica Petr. n. spec.

Plagulae, ut videtur, semper epiphyllae, irregulariter laxe vel subdense dispersae, non raro aggregatae, tunc plus minusve confluentes et magnam folii partem obtegentes, ambitu irregulares, indistincte limitatae; hyphae rectiusculae vel leniter undulatae, dense reticulato-ramosae, pellucide atro-brunneae, subremote septatae, 5—7.5 μ latae; hyphopodia subnumerosa, alternantia, saepe unilateralia, rarissime opposita, conoidea vel ampulliformia, plerumque verticaliter distantia, unicellularia, e basi 6.5—10 μ lata plus minusve attenuata, in apice 3—4 μ tantum lata, obtusa, 10—15 μ longa; ascomata subdense dispersa vel laxe gregaria, ambitu orbicularia vel late ellipsoidea, saepe irregularia, 90—150 μ diam.; membrana basali tenuissima, subhyalina, mox evanida; strato tegente radiatim contexto, ex hyphis rectiusculis, fere opace atro-brunneis sat tenuiter tunicatis, breviter articulatis, 2—3 μ, raro ad 4 μ latis, in margine interdum 3—5 μ fimbriato-prominulis composito, omnino clauso, in maturitate lobis plus minusve numerosis, acute triangularibus irregulariter stellatim dehiscente; asci pauci, plerumque 1—3 in quoque ascomate, subglobosi, crasse tunicati, 8-spori, 45—50 μ diam.; sporae conglobatae, oblongae, utrinque late rotundatae, inferne plerumque leniter sed distincte attenuatae, rectae, raro inaequilaterae, medio septatae, plus minusve, plerumque leniter constrictae, diu hyalinae, plasmate granuloso farctae, postea fere opace atro-brunneae, 26—30 ⇌ 14—16 μ; paraphysoides perpaucae, indistincte fibrosae, mox viescentes et mucosae.

Auf *Salacia* spec. Luzon, Rizal Prov.: Taytay, VIII. 1923, Nr. 4474.

Von *A. salaciae* Allesch. ist dieser Pilz durch ganz andere Hyphopodien und grössere Sporen leicht zu unterscheiden.

Asterina sponiae Rac. Paras. Algen und Pilze Javas III. p. 34 (1900).

Auf *Trema* spec. Mindanao; Davao Prov.: Mt. Apo, VI. 1924. Nr. 5267; auf *T. orientalis,* VI. 1924, Nr. 5301. — Auf *Trema* spec. Luzon; Tarlac Prov.: La Paz, XII. 1924, Nr. 6369.

Von dieser, in den Tropen und Subtropen der alten und neuen Welt verbreiteten und wohl auch sehr häufigen Art wurden schon in Annal. Mycol. XXIX. p. 225 (1931) sechs von Mrs. Clemens auf den Philippinen gesammelte Exemplare angeführt. Nach Theissen in Abh. Zool. Bot. Ges. Wien VII./3. p. 100 (1913) sollen die Aszi 50—65 ⇌ 42—52 μ, die Sporen 25—30 ⇌ 12—16 μ gross sein. Auf den drei oben genannten und mehreren anderen Kollektionen meines Herbars habe ich für die Schläuche stets nur 30—38 μ Durchmesser feststellen und alle dunkel olivbraun gefärbten, sicher schon völlig reifen

Sporen nur 20—24 ≒ 9—11.5 μ gross finden können, was mit Raciborski's diesbezüglichen Angaben völlig übereinstimmt. Wie Theissen zu seinen irrtümlichen Angaben gelangt ist, lässt sich nicht feststellen; sicher ist nur, dass seine diesbezüglichen Mitteilungen den Tatsachen nicht entsprechen!

Asterina tarlacensis Petr. n. spec.

Plagulae amphigenae, sed plerumque epiphyllae, tenues, griseo-brunnescentes, ambitu orbiculares vel late ellipticae, saepe irregulares, indistincte limitatae, 2—8 mm diam., laxe vel dense dispersae, tunc plus minusve confluentes et majores; hyphae laxe reticulato-ramosae, rectiusculae vel leniter undulatae, pellucide olivaceae, remote septatae, crassiuscule tunicatae, 3.5—5 μ, raro usque ad 6 μ crassae; hyphopodia rara, alternantia, e basi cylindracea 3.5—4 μ longa, 3—4 μ lata' subito dilatata et in lobulos 2—3 plus minusve divergentes, antice late rotundatos, irregulares, 3—10 μ longos, 2.5—4 μ latos transeuntia; ascomata laxe vel subdense dispersa ambitu orbicularia vel late elliptica, saepe obtusissime angulosa, tunc plus minusve irregularia, 70—130 μ diam., primo omnino clausa, in maturitate plerumque e centro lobis 3—6 triangularibus dehiscentia; strato basali tenuissime membranaceo, mox evanido; strato tegente radiatim contexto, ex hyphis rectiusculis vel lenissime undulatis, 3—4 μ latis, pro ratione crassiuscule tunicatis, pellucide vel fere opace atro-brunneis, breviter articulatis, in margine non vel plus minusve fimbriatim secedentibus; asci pauci, globosi vel late ovoidei, sessiles, crasse tunicati, 8-spori, 26—32 ≒ 24—30 μ; sporae conglobatae vel indistincte tristichae, oblongae vel oblongo-clavatae, utrinque late rotundatae, postice tantum interdum lenissime attenuatae, rectae, raro inaequilaterae, medio septatae, plus minusve constrictae, pellucide atro-brunneae, 18—22 ≒ 8.5—10.5 μ; paraphysoides subnumerosae, indistincte fibroso-cellulosae, hyalinae vel pallidissime griseo-brunneolae, mox viescentes et mucosae.

Auf *Celastrus paniculata.* Luzon; Tarlac Prov.: La Paz, XII. 1924. Nr. 6419.

Die meist kurz gestielten, seltener fast sitzenden Hyphopodien sind vorne in 2—3 zuweilen fast papillenförmige, oft aber auch sehr verschieden lange, mehr oder weniger divergierende Läppchen geteilt. Von der für *Celastrus* angegebenen *A. reticulata* (K. et C.) Doidge unterscheidet sich der hier beschriebene Pilz durch fast um die Hälfte kleinere Fruchtgehäuse, kleinere Aszi und etwas kleinere Sporen.

Asterina tetracerae Syd. in Annal. Mycol. XXIX. p. 235 (1931).

Auf *Tetracera scandens.* Luzon; Tarlac Prov.: La Paz. XII. 1924, Nr. 6454.

Die vorliegende Kollektion zeigt fast nur die auch schon von Sydow l. c. beschriebene *Asterostomella*-Nebenfruchtform mit

schwarzbraunen, ellipsoidischen oder eiförmigen, oben breit abgerundeten unten mehr oder weniger verjüngten und abgestutzten, 13—20 ⇌ 10—14 μ grossen Konidien.

Asterinella anamirtae Syd. in Annal. Mycol. XII. p. 558 (1914).

Auf *Anamirta cocculus*. Luzon; Pampanga Prov.: Mt. Arayat, IV. 1923, Nr. 731.

Dieser Pilz ist von einem sterilen Parasiten befallen, dessen Myzel dichte, graubraune Überzüge bildet. Fruchtgehäuse der *Asterinella* sind nur spärlich vorhanden, unreif und meist ganz verdorben. Zahlreich sind die Pykniden der zugehörigen *Asterostomula* vorhanden, die ca. 50—70 μ gross sind, breit eiförmige, ellipsoidische oder fast kugelige, schwarzbraune, 12—18 ⇌ 10—15 μ grosse Konidien enthalten.

Asterinella Clemensiae Petr. n. spec.

Plagulae hypophyllae, saepe solitariae vel irregulares et laxe dispersae, saepe e folii margine oriundae, omnino irregulares, raro fere orbiculares, indistincte limitatae, tenues, nigrescentes, 3—15 μ. interdum usque ad 20 mm diam., secus folii marginem saepe confluentes et tunc multo longiores; hyphae irregulariter et laxe reticulato-ramosae, plus minusve undulatae, crassiuscule tunicatae, subremote septatae, pellucide atro-olivaceae, 4—6 μ latae; hyphopodia nulla; ascomata laxe dispersa, ambitu orbicularia vel late elliptica, saepe obtuse angulosa et plus minusve irregularia, 130—200 μ diam., primo clausa, postea laciniis nonnullis stellatim dehiscentia; strato basali tenuiter membranaceo, subhyalino vel pallidissime griseolo, indistincte fibroso; strato tegente radiatim contexto, ex hyphis rectiusculis, crassiuscule tunicatis, breviter articulatis, 4—6 μ latis, pellucide atro-brunneis, in margine fimbriato-dissolutis composito; asci pauci, late ovoidei vel ellipsoidei, antice late rotundati, postice plus minusve, sed plerumque distincte attenuati, crasse tunicati, 8-raro 4—6-spori, 50—70 ⇌ 36—50 μ; sporae oblongae vel ellipsoideae utrinque late rotundatae, vix vel postice tantum leniter attenuatae, rectae, raro inaequilaterae, medio septatae plus minusve constrictae, pellucide atro-brunneae, 24—32 ⇌ 13—17 μ; paraphysoides paucae, laxe ramosae, 2.5—3.5 μ latae, plasmate granuloso vel guttulis oleosis minutissimis praeditae, cum ascis muco hyalino vel subhyalino indutae.

Auf *Meliosma* spec. Mindanao; Davao Prov.: Mt. Apo, VI. 1924, Nr. 6003.

Das vorliegende Material dieses Pilzes ist leider nur spärlich und durch einen sterilen Parasiten verdorben, dessen ausserordentlich reich verzweigte, heller gefärbte, dünnere Hyphen das Myzel der *Asterinella* einspinnen.

Asterinella loranthi Syd. in Philipp. Journ. Sci. C. Botany, VIII., p. 490 (1913).

Auf *Loranthus* spec., Mindanao; Davao Prov.: Mt. Apo, VI. 1924, Nr. 5558.

Stimmt mit der Beschreibung gut überein. Die Fruchtkörper sind aber oft grösser und können bis ca. 210 μ Durchmesser erreichen. Sporen fast opak schwarzbraun, 26—30 ⇌ 10—14 μ, sehr dicht mit subhyalinen, rundlichen, ca. 1 μ grossen Wärzchen besetzt.

Lembosia dimorpha Petr. n. spec.

Plagulae semper hypophyllae, solitariae vel laxe dispersae, raro numerosae, tunc aggregatae, plus minusve confluentes et magnam folii partem obtegentes, sat distincte limitatae, griseae, tenues, 6—25 mm diam., confluendo etiam multo majores et omnino irregulares; hyphae laxe vel subdense opposite et reticulato-ramosae, rectiusculae vel leniter undulatae, pellucide atro-brunneae, crassiuscule tunicatae, subremote septatae, 4.5—7 μ crassae; hyphopodia dimorpha; plurima anguste cylindracea vel elongato-conica, alternantia vel opposita, plus minusve antrorsa vel fere verticaliter distantia, apicem versus vix vel leniter attenuata, obtusa, recta vel varie curvula, 8—24 ⇌ 3.5—4.5 μ; hyphopodia altera rara et plerumque prope ascomata tantum evoluta, alternantia, ellipsoidea vel breviter cylindracea, raro fere ovoidea, antice late rotundata, integra, antrorsa vel fere verticaliter distantia, 9—13 ⇌ 6—7.5 μ; ascomata in centro plagularum irregulariter et laxe dispersa earum marginem versus saepe plus minusve in orbem concentricum disposita, interdum numerosissima, dense aggregata et confluentia, in iuventute late elliptica, postea linearia, utrinque attenuata, 700—1000 ⇌ 300—400 μ, saepe irregulariter V- Y- vel X-formiter connata, primo clausa, in maturitate rima longitudinali et irregulari, raro rectiuscula dehiscentia et plus minusve late aperta; strato basali molliter membranaceo, ca. 6—10 μ crasso, hyalino, e cellulis irregulariter rotundatis, hyalinis, 3—5 μ diam. metientibus composito; strato tegente carbonaceo, opace atro, margine in pelliculam, plus minusve interruptam, 25—50 μ, raro usque ad 100 μ latam, ex hyphis crassiuscule tunicatis, pellucide brunneis vel atro-brunneis, 3.5—5 μ latis compositam transeunte; asci subnumerosi, crasse clavati, ellipsoidei vel oblongo-ovoidei, antice late rotundati, postice plus minusve attenuati, sessiles vel indistincte crasseque stipitati, crasse tunicati, 8-raro 4—6-spori, p. sp. 45— 62 ⇌ 25—40 μ; sporae conglobatae vel indistincte tristichae, oblongae, utrinque late rotundatae, non vel leniter attenuatae, tunc oblongo-fusoideae, rectae, raro inaequilaterae, medio septatae, plus minusve, plerumque leniter constrictae, pellucide atro-brunneae, 23—30 μ, raro usque ad 34 μ longae, 12.5—14 μ latae; paraphysoides numerosae, fibrosae, ramosae, minute articulatae, superne in epithecium 8—15 μ

crassum, e cellulis rotundato-angulosis, pro ratione crassiuscule tunicatis, 3.5—6.5 μ diam. metientibus, subhyalinis vel melleis compositum transeuntes.

Auf 20—35 ≒ 7—15 cm grossen in eine mehr oder weniger lange Spitze vorgezogenen Blättern einer unbekannten Pflanze. Luzon; Bataan Prov.: Orion, V. 1923, Nr. 835.

Mit Rücksicht darauf, dass bei den meisten parasitischen und saprophytischen Pilzen, vor allem bei Vertretern der *Hemisphaeriales*, Meliolineen, Phyllachoraceen etc. die Kenntnis der Nährpflanze zur sicheren Bestimmung besonders wichtig ist, habe ich verschiedene Exemplare der Clemens-Kollektionen, deren Nährpflanzen nicht einmal der Familie nach bestimmt waren, übergangen. Bei dem oben beschriebenen, schon habituell sehr auffälligen Pilz habe ich eine Ausnahme gemacht, weil er durch die in zwei Formen auftretenden Hyphopodien sehr ausgezeichnet und leicht kenntlich ist. Die häufigere Form der Hyphopodien ist den mukronaten Hyphopodien mancher Meliolineen sehr ähnlich, schmal zylindrisch oder konisch, an der Spitze oft heller gefärbt, gerade oder verschieden, meist etwas bogen- oder fingerförmig gekrümmt.

Dieser Pilz ist aber noch in anderer Hinsicht „dimorph". Die Rasen treten meist einzeln oder sehr locker zerstreut auf, sind dann meist mehr oder weniger rundlich und sehr zart. Die Fruchtgehäuse sind dann meist im mittleren Teile der Rasen unregelmässig locker zerstreut, einzeln oder nur unregelmässig V-Y- oder X-förmig verwachsen. Weiter aussen bilden sie meist vom Zentrum durch eine schmale, sterile Zone getrennt, einen lockeren Kreisring. Zuweilen fliessen aber viele Flecken zusammen und bedecken dann eine mehr oder weniger grosse Fläche des Blattes. Die Gehäuse erscheinen dann oft so zahlreich, dass sie fast lückenlos aneinander stossen, mit den Randhäutchen verwachsen und ziemlich grosse, schwarze, dünne Krusten bilden.

Lembosia pampangensis Petr. n. spec.

Plagulae semper hypophyllae, solitariae vel binae compluresve irregulariter et laxe dispersae, ambitu orbiculares vel ellipticae, in margine saepe irregulariter lobatae et sinuosae, tunc plus minusve irregulares, nigrescentes, 2—6 mm diam., raro paulo majores; hyphae irregulariter reticulato-ramosae, plus minusve undulatae vel curvulae, crassiuscule tunicatae, pellucide atro-brunneae, remote septatae, 5—7 μ latae; hyphopodia rara vel subnumerosa, alternantia, hemisphaerica vel breviter cylindracea, antice late rotundata, unicellularia, 8—13 ≒ 6—9 μ; ascomata irregulariter dispersa, solitaria vel bina complurave aggregata, tunc saepe V- Y- vel X-formiter connata, recta vel curvula, utrinque plus minusve attenuata et late rotundata, primo clausa, in maturitate rima rectiuscula, longitudinali dehis-

centia, postea plus minusve late aperta, 300—750 ⇌ 180—260 μ; strato basali molliter membranaceo, 10—15 μ, raro usque ad 20 μ crasso, contextu pseudoparenchymatico, e cellulis rotundato-angulosis, pro ratione crassiuscule tunicatis, inferne pallidissime griseo-vel olivaceo-brunneolis, superne subhyalinis, 4—6.5 μ diam. metientibus composito; strato tegente subcarbonaceo, opace atro-brunneo, in margine tantum manifeste radiatim contexto, ex hyphis atro-brunneis 3.5—4.5 μ latis composito; asci late ovoidei vel ellipsoidei, interdum subglobosi, sessiles, antice latissime rotundati, crasse tunicati, 8-raro 4—6-spori, 40—65 ⇌ 32—40 μ; sporae conglobatae vel indistincte tristichae, oblongae vel anguste ellipsoideae, utrinque late rotundatae, vix vel postice tantum lenissime attenuatae rectae, raro inaequilaterae, medio septatae, plus minusve constrictae, obscure atro-brunneae, 23—27 μ, raro usque ad 30 μ longae, 10—13 μ latae; paraphysoides numerosae, verticaliter fibrosae, superne in epithecium 10—15 μ, raro usque ad 20 μ crassum, e cellulis rotundato-angulosis, pro ratione crassiuscule tunicatis, 3.5—6 μ diam., metientibus, pallide brunneolis vel griseo-olivascentibus compositum transeuntes.

Auf *Eugenia* spec. Luzon; Pampanga Prov.: Mt. Arayat, III. 1923, Nr. 477.

Von den *Lembosia*-Arten auf *Eugenia* unterscheiden sich *L. tenella* Lév. und *L. eugeniae* Rehm durch viel kleinere Fruchtgehäuse und Sporen, während *L. Robinsonii* Syd. durch grössere Gehäuse, Aszi und Sporen sowie durch die meist epiphyll wachsenden Rasen verschieden ist. *L. Boedijnii* Hansf. hat wesentlich kürzere, viel zahlreichere Hyphopodien und etwas kürzere, aber breitere Sporen. Bei *L. javensis* Hansf. sind die Hyphopodien bis 25 μ lang, die Sporen wesentlich grösser. *L. eugeniae-polyanthae* Hansf. hat bis 17 μ lange, oft zweizellige, gelappte Hyphopodien und etwas grössere, vor allem breitere Sporen.

Lembosia Robinsonii Syd. in Philipp. Journ. Sci. XXI. p. 143 (1922).

Auf *Eugenia* spec. Luzon; Benguet Prov.: Baguio, VI. 1923, Nr. 1511.

Ich habe diesen Pilz mit einem Originalexemplar von *L. Robinsonii* verglichen, mit dem er fast ganz übereinstimmt. Aszi und Sporen des Originales sind nur etwas grösser, jene 55—80 ⇌ 35—60 μ, diese 30—36—40 ⇌ 14—16 μ gross. Der von Clemens gesammelte Pilz hat 50—75 ⇌ 40—60 μ grosse Aszi und 30—35 μ lange, 14—16 μ breite Sporen. Diese sind übrigens bei dieser Kollektion noch unreif, nur in den Schläuchen zu sehen und hyalin. Einzelne Aszi der von Clemens gesammelten Exemplare enthalten zuweilen auch einzelne, dunkel gefärbte, dem Epithezium anhaftende Sporen, die aber stets mehr oder weniger verschrumpft und für die Bestimmung der

Dimensionen nur bedingt brauchbar sind. Ich teile jetzt hier nach der Originalkollektion noch einige Ergänzungen zur Originaldiagnose mit. Die Basalschicht ist ca. 5—12 μ dick, pseudoparenchymatisch und besteht aus rundlich eckigen, 3.5—6.5 μ grossen, relativ dickwandigen, hell olivbräunlichen Zellen. Die zwischen den Schläuchen vorhandenen Paraphysen sind ziemlich derbfädig, unregelmässig verzweigt, hyalin, 2.5—3.5 μ breit, enthalten ein perlschnurartig geteiltes Plasma und gehen oben in ein ca. 6—15 μ dickes, bräunliches, aus ca. 4—6.5 μ grossen, relativ dickwandigen, hell gelb- oder olivbräunlichen, an der Oberfläche verschleimenden Zellen bestehendes Epithezium über.

Asterostomella alchorneae Petr. n. spec.

Plagulae amphigenae, sed plerumque epiphyllae, ambitu plus minusve irregulares, raro fere orbiculares vel ellipticae, 2—8 mm diam., laxe vel dense dispersae, tunc plus minusve confluentes et magnam folii partem occupantes, indistincte limitatae, brunneo-griseae vel nigrescentes; hyphae laxe reticulato-ramosae, plus minusve undulatae vel curvulae, raro rectiusculae, subremote et indistincte septatae, tenuiter tunicatae, pellucide atro-brunneae, 3.5—6 μ latae; hyphopodia rara, alternantia, bicellularia, cellula basali brevissime cylindracea, 3—3.5 μ longa, 3—4.5 μ lata, cellula apicali irregulariter 2—3-lobulata vel minute 3—4-papillata, interdum etiam late depresso-trapezoidea vel triangularia, 4—6 μ longa, 6—8 μ lata; pycnidia subdense dispersa, saepe in consortio ascomatum juvenilium fungi ascophori, ambitu orbicularia vel late elliptica, saepe irregularia, primo clausa, in maturitate e centro irregulariter vel fere stellatim dehiscentia, postea fere usque ad marginem aperta, 60—100 μ diam.; strato tegente radiatim contexto, ex hyphis breviter articulatis, pellucide atrobrunneis, 3—4 μ latis, in margine vix vel plus minusve fimbriato-secedentibus composito; conidia in quoque pycnidio pauca, late piriformia vel ovoidea, antice latissime rotundata, recta vel inaequilatera, postice vix vel parum attenuata et truncata, fere opace atro-brunnea, 10—22 ⇌ 9—13 μ.

Auf *Alchornea sicca.* Luzon; Tarlac Prov. III. 1923, Nr. 618. — Luzon; Bulacan Prov.: Angat, XI, 1924, Nr. 6124.

In den Myzelrasen sind oft auch die ungefähr um die Hälfte grösseren Gehäuse der zugehörigen *Asterina* vorhanden, aber ganz unreif. Sie enthalten teils keine, teils nur sehr junge Aszi ohne Sporen. Die Konidien sind unten oft plötzlich zusammen- und dann oft stielartig vorgezogen. *Asterostomella lismorensis* Syd. in Annal. Mycol. XXXV. p. 49 (1937) auf *Alchornea ilicifolia* ist von der hier beschriebenen Art durch die niemals gelappten Hyphopodien und etwas kleinere, in der Mitte mit hyalinem Gürtel versehene Konidien leicht zu unterscheiden.

Asterostomella grewiae Petr. n. spec.

Plagulae amphigenae, irregulariter dispersae, ambitu orbiculares vel ellipticae, saepe omnino irregulares, interdum confluentes et magnam folii partem obtegentes, tenuissimae, etiam sub lente vix vel aegre conspicuae; hyphae irregulariter reticulato-ramosae, rectiusculae vel undulatae, olivaceae, remote septatae, 3.5—4.5 μ latae; hyphopodia rara, alternantia vel unilateralia, pulvinata, unicellularia 5—8 μ alta, 6—11 μ lata, minute 2—3-raro 4-lobulata, lobulis hemisphaericis vel papilliformibus, obtusis; pycnidia laxe dispersa, ambitu orbicularia vel elliptica, saepe plus minusve irregularia, 40—90 μ, plerumque ca. 60—75 μ diam., primo clausa, postea stellatim dehiscentia et plus minusve aperta; strato tegente radiatim contexto, ex hyphis 3—4 μ latis, breviter septatis, crassiuscule tunicatis, rectiusculis, pellucide olivaceis composito; conidia pauca, quoad formam variabilia, ovoidea, ellipsoidea vel piriformia, postice plus minusve truncata, antice late rotundata vel subtruncata, tunc obtuse triangularia, recta vel inaequilatera, raro curvula, pallide olivacea, 10—17 μ, raro usque ad 20 μ longa, 6—10 μ lata, in strati tegentis superficie interiore oriundae.

Auf *Grewia multiflora*. Luzon; Prov. Zambales: Castillejos, III. 1924, Nr. 3279.

In Gesellschaft der *Asterostomella* treten zuweilen auch junge, mehr oder weniger verdorbene Gehäuse der zugehörigen *Asterina* auf, über die schon oben bei *Asterina nyanzae* kurz berichtet wurde.

Asterostomella roureae Petr. n. spec.

Syn.: *Asterostomula roureae* in sched. 1940.

Plagulae, ut videtur, semper hypophyllae, laxe dispersae, plerumque in folii margine vel in uno nervi primarii latere evolutae, omnino irregulares, raro fere orbiculares, indistincte limitatae, tenuissimae, nudo oculo vix visibiles, pallide griseolae; hyphae irregulariter et laxe reticulato-ramosae, plus minusve undulatae vel irregulariter curvulae, raro rectiusculae, tenuiter tunicatae, indistincte et remote septatae, pallide olivaceae prope pycnidia pallide castaneo-brunneae, tenuiter tunicatae, 3—4.5 μ latae, subremote septatae; hyphopodia rarissima, sat atypica, breviter bacillari-cylindracea, recta vel subarcuata, alternantia, antice late rotundata vel truncata, 5—8 ⇌ 3—4 μ; pycnidia laxe dispersa, ambitu orbicularia, sed plerumque obtuse angulosa et plus minusve irregularia, minuta, 50—70 μ diam., raro paulo majora, primo clausa, in maturitate e centro stellatim vel irregulariter dehiscentia; strato tegente ex hyphis rectiusculis, breviter articulatis, ca. 3.5 μ latis, pellucide atro-brunneis, in margine vix vel plus minusve fimbriato-secedentibus contexto; conidia in quoque pycnidio pauca, piriformia vel late ovoidea, raro fere globosa, recta, raro inaequilatera,

ambitu latissime rotundata, postice plus minusve, plerumque abruptiuscule attenuata et distincte truncata, pellucide atro-brunnea, plerumque paulo infra medium poro germinativo praedita, 13.5—18 ⇌ 9.5—12 μ, in strati tegentis superficie interiore oriunda.

Auf *Rourea erecta*. Luzon; Tarlac Prov.: Paniqui: I. 1925, Nr. 6575.

Wächst auf dem zahlreich vorhandenen Material nur ziemlich spärlich, zuweilen in Gesellschaft von *Meliola roureae* Syd. Die Myzelrasen sind sehr zart und leicht zu übersehen. Ob die oben beschriebenen, kurz zylindrischen, oft etwas bogig gekrümmten oder an der Spitze fast rechtwinkelig geknickten Gebilde als Hyphopodien aufgefasst werden können, ist zweifelhaft; typisch sind sie sicher nicht.

Asterostomula sycopsidis Petr. n. spec.

Plagulae, ut videtur, semper hypophyllae, ambitu omnino irregulares, raro fere orbiculares, laxe vel dense dispersae, tunc saepe confluentes et magnam folii partem obtegentes, indistincte vel sat bene limitatae, tenues, nigrescentes vel obscure griseae; hyphae dense et irregulariter reticulato-ramosae, plus minusve undulatae vel curvulae, saepe binae compluresve funiformiter et parallele ordinatae, 2.5—3.5 μ latae, tenuiter tunicatae, pellucide olivaceae, indistincte septatae; pycnidia laxe vel subdense dispersa, plerumque solitaria, raro bina complurave plus minusve aggregata, tunc saepe connata, ambitu orbicularia vel late elliptica, saepe obtuse angulosa et irregularia, 60—100 μ diam., omnino clausa, in maturitate irregulariter dehiscentia, postea saepe fere usque ad marginem aperta; strato tegente radiatim contexto, obscure vel fere opace atro-castaneo, ex hyphis rectiusculis, 2—3.5 μ latis, brevissime articulatis, articulis 3—5 μ longis, composito; conidia pauca, subglobosa, late piriformia, ovoidea vel ellipsoidea, e mutua pressione interdum plus minusve angulosa et irregularia, fere opace atro-castanea, 14—19 ⇌ 12—16 μ, in strati tegentis superficie interiore oriunda.

Auf *Sycopsis philippinensis*. Luzon; Pampanga Prov.: Mt. Arayat, II. 1923, Nr. 284.

Die zu zwei oder mehreren parallel und strangartig nebeneinander verlaufenden Myzelhyphen bilden kleine, ganz unregelmässige Netzmaschen. Hyphopodien konnten nicht gefunden werden.

Einige Discomyceten aus Kärnten und Südtirol.

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Während eines Aufenthaltes im Juli 1958 im Gailtal und Lesachtal im Kärntner Gebiet, und im Juni 1957 in den Südtiroler Alpen wurde eine Anzahl inoperculater Discomyceten gesammelt, welche hier genannt werden.

Auf dürren Zweigen einer *Rubus*-Art wurde ein Discomycet gefunden, der sicher in die Gattung *Cenangiopsis* Rehm gehört, sich aber nicht mit irgend einer Art dieser Gattung identifizieren liess und deshalb als neu beschrieben wird. Der Pilz zeigt grosse Verwandtschaft mit *Cenangiopsis quercicola* (Rom.) Rehm, der Typusart der Gattung.

1. *Belonium hystrix* (De Not.) v. Höhn. — Auf toten Stengeln von *Molinia coerulea,* 7. 7. 58, Egg Forst im Gailtal, bei Neudorf (1514).

2. *Colpoma quercinum* (Fr.) Wallr. — Auf toten Ästen von *Quercus,* 12. 7. 58, bei Egg im Gailtal (1501).

3. *Graphis scripta* (L.) Ach. — Auf toten Ästen von *Alnus* spec., 17. 7. 58, bei Birnbaum im Lesachtal (1485).

4. *Hyaloscypha* cf. *callorioides* Rehm. — Auf toten Stengeln von *Eupatorium* spec., 19. 7. 58, im Garnitzenklamm, bei Neudorf im Gailtal (1519).

5. *Hypoderma* spec.? — Auf toten Stengeln von *Centaurea* spec., 14. 7. 58, bei Michelsdorf im Gailtal. Zusammen mit *Leptosphaeria ogilviensis* (B. & Br.) Ces. & De Not. (1517).

6. *Dasyscypha clandestina* (Bull. ex Fr.) Fuck. — An toten Ästen von *Corylus,* 17. 7. 58, bei Birnbaum im Lesachtal (1510).

7. *Dasyscypha leucophaea* (Pers. ex Weinm.) Massee. — Auf toten Stengeln von *Adenostyles* spec., 9. 7. 58, im Garnitzenklamm, bei Neudorf im Gailtal (1506). Mit *Leptosphaeria Nitschkei* Rehm. — Auf toten Stengeln von *Delphinium* spec., 19. 6. 57, bei Partschins im Vintschgau (1402).

8. *Dasyscypha relicina* (Fr.) Boud. — An toten Stengeln von *Eupatorium* spec., 11. 7. 58, im Garnitzenklamm, bei Neudorf im Gailtal (1520). — Auf toten Stengeln von *Adenostyles* spec., 9. 7. 58, im Garnitzenklamm, bei Neudorf im Gailtal (1507).

9. *Dasyscypha virginea* (Batsch ex Fr.) Fuck. — Auf toten Stengeln einer Farne, 17. 7. 58, bei Birnbaum im Lesachtal (1511).

10. *Encoelia fasciculariis* (Fr.) Karst. — Auf toten Ästen von *Populus tremula,* 20. 6. 57, bei Partschins im Vintschgau (1400).

11. *Patinella* spec. — Auf toten Ästen von *Alnus* spec., 17. 7. 58, bei Birnbaum im Lesachtal (1502).

12. *Phialea cyathoidea* (Bull. ex Fr.) Gill. — Auf toten Stengeln von *Solanum tuberosum,* 8. 7. 58, im Egg Forst bei Egg im Gailtal (1515).

13. *Pseudophacidium ledi* (A. & S.) Karst. — Auf toten Ästen von *Rhododendron ferrugineum,* 16. 6. 57, bei Partschins im Vintschgau (1419).

14. *Pyrenopeziza galii-veri* (Karst.) Sacc. — Auf toten Stengeln von *Galium verum,* 10. 7. 58, Michelsdorf im Gailtal (1498, 1499); bei Möderndorf im Gailtal, 11. 7. 58, (1497, 1500).

15. *Pyrenopeziza rubi* (Fr.) Rehm. — Auf toten Ranken von *Rubus* spec., 11. 6. 57, beim Dorf Partschins im Vintschgau (1399).

16. *Stictis arctostaphylli* Ferd. & Winge. — Auf toten Blättern von *Arctostaphylos uva-ursi,* 18. 6. 57, am Vigiljoch bei Lana im Vintschgau (1388).

17. *Tapesia fusca* (Pers.) Fuck. — Auf toten Ästen von *Corylus* und *Alnus,* 17. 7. 58, bei Birnbaum im Lesachtal (1516, 1518).

18. *Therrya Fuckelii* (Rehm) Kujala. — Auf toten Ästen von *Pinus sylvestris,* 13. 6. 57, bei Töll im Vintschgau (1407).

19. *Tryblidiopsis pinastri* (Pers.) Karst. — Auf Stämmen von *Picea abies,* 8. 7. 58, im Egg Forst bei Egg im Gailtal (1512); auf dünnen, toten Zweigen von *Picea abies,* 11. 7. 58, im Garnitzenklamm bei Neudorf im Gailtal (1505).

20. *Tympanis alnea* (Pers.) Fr. — Auf toten Ästen von *Alnus* spec., 17. 7. 58, bei Birnbaum im Lesachtal (1504).

21. *Tympanis laricina* (Fuck.) Sacc. — Auf toten, dünnen Zweigen von *Larix decidua* (*Pleurophomella*-Form), 15. 7. 58, bei Neudorf im Gailtal (1513).

22. *Tympanis ligustri* Tul. — Auf toten Zweigen von *Ligustrum* spec., 16. 7. 58, bei Braunitzen im Gailtal (1503).

23. **Cenangiopsis rubicola** Gremmen nov. spec.

Apothecia caulicola, circa 500 μ diam., matrici innata, maturitate emergentia, sessilia. Hymenium pallide brunneum. Hypothecium hyalinum. Excipuli textura prismatica, brunnea. Asci clavati, 54 ⇌ 4 μ, octospori, poro iodo non coerulescente. Ascosporae hyalinae, continuae, 6—8 ⇌ 2—2.5 μ. Paraphyses lanceolatae, hyalinae, 75—80 ⇌ 5 μ. Setae 30—40 μ longae, brunneae, crystallis minutissimis obtectae.

Hab. in caulibus anni praeteriti *Ruborum,* Italia, Valle Venosta, Parcines, 11. 6. 57, Gremmen 1387 Typus, Gremmen 1401 Isotypus.

Die Apothecien sind ca. 500 μ gross, subepidermal; sie brechen bei der Reife mittels eines 600—800 μ grossen, runden oder eiförmi-

gen Deckels, welcher an einer Seite mit dem Substrat verbunden bleibt und erst später [ähnlich wie bei *Trochila ilicis* (Chév) Crouan] ganz abgeworfen wird, an die Oberfläche durch. Das entblösste Hymenium ist hellbraun und mit einem weissen Rand versehen. Das Hypothecium ist farblos und ungefähr 20 μ dick. Das Excipulum dagegen ist braun, mit deutlicher textura prismatica aufgebaut und trägt marginale Haare, welche ebenfalls braun gefärbt sind, 30—40 μ Länge aufweisen und winzige Kristalle tragen. Die Asci messen 54 ⇌ 4 μ, sie sind zylindrisch, breit aufsitzend und am Scheitel mit einem durch Jod färbbaren Apikalapparat versehen und achtsporig. Sie werden umgeben von farblosen, lanzettförmigen, 75—80 ⇌ 5 μ grossen Paraphysen. Die Ascosporen sind undeutlich keulig, an einer Seite deutlich abgerundet, an der anderen Seite mehr oder weniger zugespitzt, einzellig, hyalin, 6—8 ⇌ 2—2.5 μ gross.

In niederländischen Proben von *Cenangiopsis quercicola* (Rom.) Rehm wurde beobachtet, dass auch bei diesen das Hymenium sich in einigen Fällen mittels eines runden Deckels öffnet. Die Haare auf den Apothecien sind aber deutlich keulenförmig und grösser (50—60 ⇌ 4—5 μ). Bisher ist dieser Pilz auch nur auf Eichenästen gefunden worden.

Auf *Rubus*-Ranken wurde von Feltgen *Cenangiopsis Noppeneyana* (Feltg.) Rehm beschrieben. Ich habe von diesem Pilz eine Originalprobe untersuchen können, welche mir in freundlicher Weise von Herrn Dr. M. Heuertz, Konservator des Naturhistorischen Museums in Luxemburg, zur Verfügung gestellt worden ist. Leider existiert nur noch der Umschlag mit einigen Notizen und Zeichnungen. Aus der Beschreibung von Rehm lässt sich aber entnehmen, dass wohl die Ascosporen übereinstimmend gebaut sind, dass aber die Haare und Asci ganz verschieden sind.

Ich möchte an dieser Stelle Herrn Dr. Em. Müller (Konservator, Institut für Spezielle Botanik, Zürich) für seine wertvolle Hilfe und kritische Bemerkungen bei der Übersetzung danken.

Leptosphaerulina McAlp. antedates Pseudoplea Höhn.

Lewi E. Wehmeyer[1])

In a previous paper (Mycologia **46**: 83) the writer discussed a group of related genera often confused in the literature and concluded that the genus *Pseudoplea* was the prior generic name for a group of leaf inhabiting species distinct from the genus *Saccothecium (Pleosphaerulina).*

During a recent visit, Dr. Emil Müller kindly pointed out that MacAlpine's genus *Leptosphaerulina* was described with a figure of an ascus suggesting the genus *Pseudoplea.* The genus *Pseudoplea.* The genus *Leptosphaerulina* was described in 1902 (Fungus dis. of Stone Fruit trees, p. 103), with *L. australis* McAlp. as the type species, and, therefore, has priority over the name *Pseudoplea* Höhn. (1918).

Through the kindness of Miss Eileen Fisher, the writer has been able to study the four collections of *L. australis* in the Herbarium of the Department of Agriculture of Victoria, Austrialia. None of these collections appear to be the type, which was given as on *Prunus armeniaca* from Queensland. The type seems to be lost., but these collections are all determined by McAlpine.

Collection No. 1 showed only pycnidia of a *Phyllosticta.* No. 2 yielded only fascicles of conidiophores with a Hyphomycete of the *Scolecotrichum* type. On No. 3 a few minute ascostromata, 50—100 μ in diameter were found on a tan necrotic spot. These were light brown, membranous and had punctate ostioles. They contained broad saccate, often flattened asci with thickened walls and a nipple-like extension at the apex, which is typical of the genus *Pseudoplea.* They were 53—70 × 37 μ, with triseriate spores which were mostly immature. The mature spores were ellipsoid, hyaline, 3—4 septate, with the fourth septum inserted in the lower end, a vertical septum in the two central cells, and 29—32 × 14 μ. In collection No. 4 a few similar ascostromata but no asci or spores were found on the leaves of *Dolichos.* On the leaves of *Papaver,* a few ascostromata 80—100 μ in diameter were found with saccate asci 55—62 × 35 μ and 3—4 septate hyaline spores 27—32 × 12.5 μ, which were identical with those on collection No. 3.

From these facts it seems true that Höhnel's and the writer's concept of the genus *Pseudoplea* coincides with that of McAlpine's

[1]) Papers of the Dept. of Botany of the Univ. of Michigan No. 1099.

concept of his genus *Leptosphaerulina*, and as the latter name has priority, *Pseudoplea* must become a synonym of *Leptosphaerulina* Mc.Alp.

Inasmuch as the *Papaver rhoeas* component of collection No. 4 is the earliest to show a fungus corresponding to McAlpine's description No. 4 is the earliest to show a fungus corresponding to McAlpine's description, it is proposed as the neotype of the genus *Leptosphaerulina*, in the absence of a holotype, although it must be admitted that there is very little material in either collection Nos. 3 or 4.

Leptosphaerulina and the genus *Wettsteinina* Hohn (1907) are also closely related and grade off one into the other. The species of *Wettsteinina* tend to have larger, hyaline spores usually without vertical septa, whereas the tendency in *Leptosphaerulina* is toward smaller, muriform spores which may become pigmented at maturity but further comparative studies are needed to determine their logical separation.

Collections: No. 1. On Arum Lily (*Richardia* ?), Armadale, Melbourne, Aug. 12, 1892, McAlpine. No. 2. On *Dolichos* leaf and *Aquilegia,* Armadale, July 1, 1904, G. P. R., Det. McAlpine. No. 3 on Hops, Armadale, Feb. 28, 1904, McAlpine. No. 4. On *Dolichos lignosus,* July 12, 1901. and *Papaver rhoeas,* Oct. 21, 1902, Port Foury, Camberwell. (marked with a red circular sticker).

Kleine Beiträge zur mikrobiologischen Methodik.

Von Herbert Schirmer
(Forschungsstelle für Antibiotika an der I. medizin. Universitätsklinik in Wien)

und Hannes Gsur
(Gärungslaboratorium, I. chem. Universitätsinstitut in Wien).

1. Eine einfache Methode zur quantitativen und qualitativen Erfassung von Mikroorganismen entwickelter Gase.

Von H. Schirmer.

Zur Erfassung des Gärvermögens, sei es nun im Rahmen der Identifizierung von Mikroorganismen oder zur qualitativen und quantitativen Feststellung der im Verlaufe biochemischer Vorgänge entwickelten Gase wird im allgemeinen das Gärrohr verwendet.

Nachstehend soll eine Methode beschrieben werden, die es erlaubt, mit einfachen Hilfsmitteln oben angeführte Untersuchungen durchzuführen. Als Messgefässe werden sterile Pipetten verwendet, deren Mundstück vor dem Sterilisieren mit einem Wattepfropfen leicht verschlossen wurde, um im Verlaufe der Arbeit jede Infektionsmöglichkeit auszuschliessen. Von den Pipetten sind meines Erachtens englumige Messpipetten von 1—2 ml Gesamtvolumen am besten geeignet. Es sollte auch angestrebt werden, innerhalb einer Versuchsreihe möglichst gleiche Pipetten zu verwenden.

Es wird nun so vorgegangen, dass ein bestimmtes Volumen des mit dem auf Gärvermögen zu untersuchenden Organismus beimpften flüssigen Nährbodens in die Pipette aufgesogen wird, worauf man die Spitze der Pipette an der Aussenseite mit einem Stück sterilen Zellstoff gut abtrocknet und in verflüssigtes Paraffin eintaucht. Nach einigen Sekunden hat sich ein gas- und flüssigkeitsdichter Überzug aus Paraffin gebildet. Die Pipette wird jetzt senkrecht, mit der Mundöffnung nach unten, aufbewahrt und bebrütet. Nach Abschluss der Bebrütungszeit wird zur quantitativen Ermittlung der Gärleistung bei waagrechter Lage der Pipette die dem Mundstück zunächst liegende Grenze der Flüssigkeit abgelesen und das Gasvolumen durch Abziehen des Volumens der zu Versuchsbeginn eingebrachten beimpften Flüssigkeit errechnet.

Soll die Art des entwickelten Gases ermittelt werden, so empfiehlt es sich, die mit Paraffin verschlossene Pipettenspitze in das entsprechende Reagens (z. B. $BaOH_2$) zu tauchen, das Paraffin abzustreifen und das Gas durch leichtes Anblasen in die Flüssigkeit zu drücken.

2. Sterilisation unsteril gewonnener Milch zur Weiterverarbeitung im Dilutionstest.

Von H. Schirmer.

Wenn man den Antibiotikumgehalt unsteril gewonnener Milch bestimmen will und dabei aus bestimmten Gründen die Verdünnungsreihe der Agrardiffusionsmethode vorzieht, so hat sich in unserem Laboratorium folgendes Verfahren gut bewährt:

Von den einzelnen Milchproben werden je 2 ml in Wassermann-Röhrchen gegeben, mit 1 ml Äther überschichtet, durchgeschüttelt und 20 Minuten bei Raumtemperatur stehengelassen. Dieselbe Behandlung erfährt die Antibiotikumlösung (in Milch), die zur Herstellung der Standardreihe verwendet wird.

Anschliessend wird der Äther, der sich nach einigen Minuten bereits zu entmischen beginnt, im Wasserbad bei 40° C oder im Exsikkator durch Anlegen eines Vakuums abgedampft. Als annähernde Kontrolle des Zeitpunktes, an dem die Verdampfung des Äthers beendet ist, wird ein Röhrchen zugegeben, das nur 1 ml Äther enthält.

Die so präparierte Milch ist zur weiteren Verarbeitung im Dilutionstest geeignet.

3. Der Dampfdrucktopf „Kelomat" als Autoklav im mikrobiologischen Laboratorium.

Von H. Schirmer und H. Gsur.

Ursprünglich mehr aus finanziellen als aus anderen Überlegungen heraus wurden in unseren Laboratorien Dampfdruckkochtöpfe der Marke „Kelomat" mit einem Volumen von 10 l für die Verwendung als behelfsmässige Autoklaven angeschafft. Sie haben sich jedoch in der Zwischenzeiit (1 bzw. 3 Jahre) für Nährbodenbereitung, Sterilisation von Glasgeräten, Injektionsnadeln und Spritzen, Abtötung pathogenen Versuchsmaterials etc. so gut bewährt, dass auf die Nachschaffung von Autoklaven verzichtet werden konnte, da alle anfallenden Arbeiten ohne Schwierigkeiten und zur vollsten Zufriedenheit durchführbar waren.

Das für den „Kelomat" Gesagte dürfte selbstverständlich auch für Dampfdruckkochtöpfe anderer Marken und Volumina Gültigkeit haben.

4. Eine einfache Vorrichtung zur Erleichterung des Pipttierens bei mikrobiologischen Arbeiten.

Von H. Schirmer.

Werden bei mikrobiologischen Arbeiten Pipetten verwendet, so bereitet das Festhalten einer eventuell verbliebenen Flüssigkeitsmenge in der Pipette bei gleichzeitigem Abflammen, Stöpseln, Schütteln etc. der anderen Versuchsgefässe meist einige Schwierigkeiten.

Diesem Umstand kann jedoch durch das Aufsetzen eines Quetschhahnes auf das Mundstück der Pipette leicht abgeholfen werden. Die nachstehend beschriebene Vorrichtung ist mit einfachen Mitteln herstellbar und hat sich in unserem Laboratorium gut bewährt.

In 5 bis 6 cm eines nicht zu starkwandigen Gummischlauches, dessen innere Weite auf den (annähernd gleichen) Mundstücken der Pipetten gut dichtend aufsitzen soll, wird auf einer Seite ein 4 cm langes Glasrohr fest eingepasst, so dass ungefähr 2 cm des Rohres im Gummischlauch sitzen und die andere Hälfte daraus hervorragt. Die Enden dieses Glasrohres, das als Mundstück dienen soll, werden sorgfältig rundgeschmolzen. Von dem noch freien Ende des Gummischlauches her wird nun eine Glaskugel, wie sie zur Verhütung des Siedeverzuges in jedem Laboratorium vorrätig ist, bis zur Mitte des Schlauchstückes eingeführt. Die Kugel soll an der inneren Schlauchwand gut dichtend anliegen, jedoch ohne zu grosse Spannung der Gummiwand, da dies die Bildung eines seitlichen Luftkanals durch Fingerdruck erschweren würde. Der Quetschhahn ist somit fertig und kann mit dem freien Schlauchende auf das Pipettenmundstück aufgesetzt werden.

Durch leichten Fingerdruck an der der Glaskugel anliegenden Schlauchstelle wird ein Luftkanal gebildet, der Veränderungen der Flüssigkeitsmenge in der Pipette (Ansaugen oder Auslaufen) erlaubt. Bei Aufhören des Druckes kommt die Flüssigkeitsbewegung sofort zum Stillstand, die Pipette kann auch abgestellt werden, ohne weiter auszulaufen. Ebenso ermöglicht der oben beschriebene Quetschhahn ein sehr genaues Pipettieren kleiner Flüssigkeitsmengen.

5. Eine variierte Plättchenmethode zur Bestimmung von Penicillinkonzentrationen in 0.01 ml Blut.

Von H. Schirmer.

Im Verlaufe von Untersuchungen an der II. Wiener Univ.-Frauenklinik, bei denen die Penicillinspiegel vom Venenblut (Vb) der Wöchnerinnen, dem Nabelvenenblut (Nvb) und dem Blut aus der Ferse (Fb) des Neugeborenen zu bestimmen waren, ergab sich das Problem, letztere Entnahme unter möglichst grosser Schonung

des Säuglings durchzuführen. Es wurde daher nachstehend beschriebene Methode ausgearbeitet, die eine Bestimmung der Penicillinkonzentration in 0.01 ml des aus der Ferse entnommenen Blutstropfens (Gesamtblut) erlaubt.

Die Sera des Vb und Nvb wurden im gebräuchlichen Verdünnungstest mit Staph. aureus SG 511 als Testorganismus aufgearbeitet. Bezüglich der Methode sei auf Lit. 1, 2, 3, 4, 5, 6, 7 verwiesen. Die 0.01 ml des Fb wurden gleich nach Abnahme auf Papierblättchen (Φ 9 mm, Papier Schleicher und Schüll Nr. 2247, siehe Lit. 8) gebracht und eintrocknen gelassen. Auf zwei andere Papierblättchen derselben Art wurden 0.001 ml des Vb (Gesamtblut) und Nvb (Gesamtblut) aufgebracht und zum Zwecke der nochmaligen Sterilisation des Filterpapiers annähernd 30 Minuten bei Raumtemperatur unter der UV-Lampe eintrocknen gelassen.

In einer ebenen Petrischale wurde der für den Deckguss angegebene, zu 10% mit einer Schüttelkultur von *Sarcina lutea* beimpfte DIFCO-Spezialnährboden in einer Schichthöhe von 2 mm ausgegossen und erstarren gelassen. Nach Auflegen der oben beschriebenen Filterscheiben kann man nun, je nach der erwarteten Blutspiegelhöhe, das Antibiotikum für einige Stunden bei 5° C vordiffundieren lassen und anschliessend 18 bis 22 Stunden bei 24° C bebrüten.

Durch die in der Verdünnungsreihe gewonnenen Werte für die Sera des Vb und Nvb ist es nun möglich, die Hemmhofdurchmesser des Vb (Gesamtblut) und Nvb (Gesamtblut) auf eine Standardlinie einzutragen und die Penicillinkonzentration des Fb durch Vergleich seines Hemmhofdurchmessers mit den beiden anderen Werten zu bestimmen. Zu beachten ist, dass der erhaltene Wert die Penicillinkonzentration des Serums des Fb angibt, da als Basis der Berechnung die Sera von Vb und Nvb verwendet wurden. Nach Klein (Lit. 9) sind die Serumkonzentrationen, bezogen auf die Volumseinheit, 1.65mal höher als die Antibiotikumkonzentrationen des Gesamtblutes.

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Neue Literatur

Bärner, J., Bibliographie der Pflanzenschutzliteratur. 1948—1949, XLI u. 689 pp. — Biologische Bundesanstalt für Land- und Forstwirtschaft in Berlin-Dahlem. (Im Buchhandel zu beziehen durch den Verlag P. Parey, Berlin, S.W. 68, Lindenstrasse 44—47.) 1958. — DM 65.—.

Die von Morstatt begründete Bibliographie der Pflanzenschutzliteratur wurde vom Verf. nach dem zweiten Weltkriege fortgesetzt. Für die Jahre 1940—1945, 1946—1947 und 1950 ist die Bibliographie schon erschienen; diesbezügliche Besprechungen sind in Sydowia VIII. p. 360 (1953) und X. p. 319 (1956, ersch. 1957) zu finden. Der vorliegende, nach demselben Plane bearbeitete Band bringt die Bibliographie für die Jahre 1948—1949 und enthält über 21.100 Literaturzitate. Hoffentlich wird Verf. sein von wahrem Bienenfleiss zeugendes, wertvolles Nachschlagewerk recht bald bis auf die neueste Zeit forsetzen können.

F. Petrak.

Bärner, J., Literaturquellen und ihre Kürzungen aus der Bibliographie der Pflanzenschutzliteratur. 167 pp. 1958. — Biologische Bundesanstalt für Land- und Forstwirtscahft in Berlin-Dahlem. — Nicht im Handel!

Verf. hat ein alphabetisch geordnetes Verzeichnis der Literaturquellen zusammengestellt und die in der von ihm verfassten „Bibliographie der Pflanzenschutzliteratur" angewendeten Abkürzungen angegeben.

F. Petrak.

Ciferri, R., G. Lindau et P. Sydow, Thesaurus Literaturae Mycologicae et Lichenologicae. Supplementum I. 1911—1930. — 2. Teil, E—K, p. 690—1477, 1958. — 3. Teil, L—Q, p. 1478—2156, 1959. — R. Cortina, Casa editrici, Pavia, Viale Golgi, 14, Italia.

Der erste Teil dieses die lichenologisch-mykologische Literatur für die Jahre 1911—1930 enthaltenden Standardwerkes ist im Jahre 1957 erschienen und wurde schon in Sydowia XI. p. 475 (1957, ersch. 1958) ausführlich besprochen. Das Erscheinen der Fortsetzungen hat sich etwas verzögert. In den beiden neu erschienenen Teilen wird das Werk bis zum Titel Nr. 12370 fortgeführt. Allen Lichenologen, Mykologen und Phytopathologen soll dieses wichtige, relativ billige bibliographische Werk nochmals dringend zur Anschaffung empfohlen werden.

F. Petrak.

Gause, G. F., Preobrashenskaja, T. P., Kudrina, E. S., Blinow, N. O., Rjabowa, J. D., Sweschtnikowa, M. A. Zur Klassifizierung der Actinomyceten. Aus dem Russischen übersetzt von Brigitta Fecher, Berlin-Johannistal. Mit 18 Abb. im Text und 1 Farbtafel, 8°, XII und 169 pp. 1958. Verlag G. Fischer, Jena. — Halbleinen DM 17,90.

In den letzten Jahren hat das Bestreben, neue Antibiotika zu entdecken, viele Mikrobiologen angeregt, die bis in die neueste Zeit nur wenig beachteten Aktinomyzeten einem intensiven Studium zu unterziehen, weil es sich gezeigt hat, dass verschiedene Arten dieser Pilze wirksame Antibiotika zu bilden imstande sind. Bei diesen Forschungsarbeiten ergaben sich aber auch viele, die Klassifizierung und Identifizierung der Strahlenpilze betreffende Fragen, die viele Mikrobiologen zu diesbezüglichen Studien angeregt haben.

In den letzten Jahren wurde am Institut für die Erforschung neuer Antibiotika der Akademie der Medizinischen Wissenschaften der UdSSR ein sehr reiches Untersuchungsmaterial zustandegebracht. Aus Böden der verschiedensten geographischen Zonen wurden ungefähr 100.000 Kulturen von antagonistisch wirksamen Aktinomyzeten isoliert. Zahlreiche Forscher haben dieses Material studiert und systematisch bearbeitet, wobei auch verschiedene, Ökologie und Verbreitung der Strahlenpilze betreffende Fragen geklärt werden mussten.

Im ersten Kapitel wird die Klassifizierung der Aktinomyzeten mit Rücksicht auf die Antibiotikaforschung erörtert und eine historische Übersicht mitgeteilt. Im zweiten „Prinzipielles zur Klassifizierung der Aktinomyzeten" betitelten Abschnitt werden von den Verfassern die Grundlagen für die Klassifizierung dieser Pilze und Probleme ihrer Veränderlichkeit und Phylogenese erörtert.

Von grosser Wichtigkeit für die Klassifizierung sind die bei der Kultur auf verschiedenen Substraten auftretenden Wuchsformen und Veränderungen der Nährmedien. Zwei verschiedene, als „Substrat 1 mit mineralischer Stickstoffquelle" und „Substrat 2 mit organischer Stickstoffquelle" bezeichnete Nährböden, deren Zusammensetzung genau angegeben wird, werden als besonders wichtig in den Beschreibungen der einzelnen Arten vorangestellt. Ausserdem werden auch die charakteristischen Merkmale der Kulturen auf Milch, Gelatine, Stärke-Agar, Kartoffel, Zellulose, Nitrate und Saccharose angegeben. Die antagonistischen Eigenschaften werden geschildert und angegeben, welche Bakterien und Pilze in den Kreis dieser Untersuchungen gezogen wurden. Herkunft und Verbreitung wird bei jeder Art ausführlich besprochen. Angeführt werden 108 Strahlenpilzarten, von denen viele neu sind. Als wichtigstes, bei der Klassifizierung in Betracht kommendes Merkmal wurde die Farbe des Luftmyzels und die in den Kulturen auftretende, zuweilen auch fehlende Verfärbung des Substrates erkannt. Zahlreiche Tabellen und viele Abbildungen ergänzen die übersichtliche Gliederung des Stoffes.

Für die in der Landwirtschaft und Medizin tätigen Mikrobiologen, ganz besonders aber für die Antibiotikaforschung und die damit zusammenhängende, pharmazeutische Industrie wird dieses Werk ein überaus wichtiges Hilfsmittel sein, dessen Anschaffung allen Interessenten wärmstens empfohlen werden kann.

F. Petrak.

Kotte, W., Krankheiten und Schädlinge im Obstbau und ihre Bekämpfung. 3., völlig neubearbeitete und erweiterte Auflage. 536 pp., 233 Textfig., 8 Farbtafeln. 1958. — Verlag P. Parey, Berlin & Hamburg. — Ganzleinen DM 54,—.

Jeder Obstzüchter hat heute schon die Notwendigkeit einer planmässigen Bekämpfung der Schädlinge und Krankheiten erkannt, durch deren Auftreten früher oft grosse, ja verheerende Schäden verursacht wurden. Die vorliegende, völlig neubearbeitete, stark erweiterte und reich illu-

strierte dritte Auflage des in Fachkreisen sehr geschätzten Werkes berücksichtigt vor allem die grossen Erfolge und Fortschritte, die in den letzten Jahren auf allen Gebieten der Phytopathologie, ganz besonders aber durch die Entdeckung vieler neuer guter Methoden und Mittel bei der Bekämpfung von Schädlingen und Krankheiten der Obstgehölze gemacht wurden.

Im ersten Teile des Werkes wird vom Verf. die wirtschaftliche Bedeutung des Pflanzenschutzes im Obstbau besprochen. Der zweite Teil ist allgemein giltigen, das Auftreten tierischer und pflanzlicher Schädlinge fördernden Umständen sowie den durch ungünstige Einflüsse des Klimas, des Bodens oder anderer äusserer Faktoren bedingten Schäden gewidmet. Eine gründliche Umarbeitung haben die Abschnitte über Ernährungskrankheiten, Viren, Bekämpfungsmittel und Gerätetechnik erfahren. Neu aufgenommen wurden verschiedene Krankheiten, die in den letzten Jahren stärker als früher aufgetreten sind oder auch solche, deren Auftreten, Verbreitung und Bekämpfung durch neuere Untersuchungen besser bekannt und erforscht worden sind.

Im ersten Abschnitt des speziellen Teiles werden zuerst jene Krankheiten und Schädlinge behandelt, die an mehreren Obstarten auftreten. Der zweite, umfangreichste Abschnitt beschäftigt sich mit den Krankheiten der nachstehend genannten Obstarten: Apfel, Birne, Quitte, Kirsche, Pflaume — Zwetsche — Mirabelle, Pfirsich, Aprikose, Walnuss, Edelkastanie, Haselnuss, Weinstock, Himbeere, Brombeere, Johannis-, Stachel- und Erdbeere. Jeder Obstart wird ein Bestimmungsschlüssel für alle darauf vorkommenden parasitären und nichtparasitären Schäden vorangestellt, der in viele kleine, die Schäden der Wurzel, des Stammes, der Zweige und Triebspitzen, der Knospen, Blüten, Blätter und Früchte behandelnde Abschnitte geteilt ist. Die einzelnen Schädlinge und Krankheiten werden je nach der ihnen zukommenden Bedeutung mehr oder weniger ausführlich geschildert. Die vielen neuen Pflanzenschutzmittel werden unter Berücksichtigung der Vor- und Nachteile besprochen und für die Anwendung von Giften auf die dabei zu beachtenden Vorsichtsmassnahmen hingewiesen. Ein besonderes Kapitel bespricht den Schutz der Nutztiere, vor allem der Bienen, die durch unsachgemässe Anwendung giftiger Bekämpfungsmittel schwere Schäden erleiden können. Auch die Zukunftsaussichten der „biologischen Schädlingsbekämpfung" werden berücksichtigt. Ein ausführliches, 1380 Zitate umfassendes Literaturverzeichnis wird vor allem den Studierenden und allen im Obstbau tätigen Pesonen, die sich mit einzelnen Fragen näher beschäftigen wollen, gute Dienste leisten.

Wie in fast allen phytopathologischen Werken, werden manche Pilze nicht richtig benannt. Nur einige Beispiele seien hier kurz erwähnt: Der die Bitterfäule des Apfels verursachende Pilz gehört nicht zu *Gloeosporium*, sondern zu *Colletotrichum*. Der Erreger der *„Physalospora"*-Fäule ist eine *Botryosphaeria*, die zugehörige Konidienform gehört zu *Botryodiplodia*, nicht zu *Sphaeropsis*. Der die Blattfallkrankheit der Johannisbeere verursachende Pilz hat richtig *Drepanopeziza ribis* (Kleb.) v. Höhn. zu heissen. *Rhabdospora ramealis*, der Erreger der Brombeerrankenkrankheit ist vom Typus der Gattung *Rhabdospora* ganz verschieden und hat *Septocyta ramealis* (Rob.) Petr. zu heissen.

Bei einigen Obstarten könnten wohl noch andere, zwar nicht weit verbreitete, in manchen Gegenden jedoch oft häufig auftretende Krankheiten aufgenommen werden, von denen hier nur der rote Brenner des Weinstockes und die durch *Coniella diplodiella* (Speg.) Petr. et Syd.

verursachte, im südlichen Niederösterreich zuweilen häufig auftretende Trockenfäule der Weinbeeren genannt werden sollen.

Nicht nur die Obstzüchter, auch alle phytopathologischen Institute, die Fachberater des Obstbaues und die Lehrer an landwirtschaftlichen Schulen werden das vom Verlag prächtig ausgestattete, reich und vorzüglich illustrierte, leicht verständlich geschriebene Werk des als ausgezeichneten Phytopathologen gut bekannten Verf. nicht entbehren können.

F. Petrak.

Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft Berlin-Dahlem.

Heft 94. Oktober 1958. Zeumer, H., Rückstände von Pflanzenschutz- und Vorratsschutzmitteln von sonstigen Schädlingsbekämpfungs- und Unkrautbekämpfungsmitteln sowie von Mitteln zur Beeinflussung des Pflanzenwachstums. Literatur-Übersicht.

Die vorliegende Literatur-Übersicht berücksichtigt den Zeitraum von 1955 bis Ende 1957 und enthält folgende Kapitel:

A) Angaben über die Höhe der Rückstände (auch Toleranzen) auf oder in Erntegut und sonstigen Nahrungsmitteln wie Obst, Gemüse, Getreide, Mehl, Getränke, Konserven u. a. sowie über deren Einwirkung auf den Menschen.

B) Angaben über die Einwirkung der Rückstände auf Tiere, wie Giftwirkung, Speicherung, Metabolismus, Ausscheidung (Milch).

C) Angaben über Einwirkung von Rückständen auf Pflanzen, wie Aufnahme, Transport, Metabolismus, biochemische Änderungen in der Pflanze.

D) Angaben über Rückstände im Boden, wie Höhe der Rückstände, Metabolismus, Einwirkung auf Bodenflora und -fauna.

E) Methoden zur Bestimmung von Rückständen auf oder in biologischem Material, auf sonstigen Oberflächen und in Böden.

F. Petrak.

Pilat, A. & Ušak, O., Naše Houby II. Kritické druhy našich hub. Nakladatelstvi Československé Akademie věd. Praha 1959, 4°, 345 pp., 160 Farbentaf. — Ganzleinen Kčs. 100.—.

Im ersten, vor fünf Jahren erschienenen Teile dieses Abbildungswerkes wurden die häufigeren und wichtigeren Speise- und Giftpilze behandelt. Seither hat sich die Notwendigkeit ergeben, das Werk durch einen zweiten, seltenere, weniger bekannte oder kritische Arten enthaltenden Teil zu ergänzen. Während der Jahre 1945—1952 wurden vom Kunstmaler O. Ušak ungefähr 180 Aquarelle hergestellt. Davon wurden 160 ausgewählt und im vorliegenden 2. Teile des Werkes aufgenommen.

Die Pilze wurden, so wie im ersten Teile, wieder in natürlicher Grösse und in verschiedenen Stadien der Entwicklung und Färbung dargestellt, wodurch die sichere Bestimmung vieler veränderlicher Arten sehr erleichtert wird. Es wurden unter anderem auch zahlreiche Cortinarien abgebildet, deren Fruchtkörper in jungem Zustande oft ganz anders aussehen als im Stadium der Sporenreife. Die Bestimmung dieser Pilze nach Beschreibungen allein ist ohne Zuziehung guter Abbildungen sehr schwierig und für den Anfänger so gut wie unmöglich. Von diesen, auch

in der Čechoslowakei durch zahlreiche, oft häufige und weit verbreitete Arten vertretenen Pilzen konnte zwar nur eine kleine Auswahl der häufigeren Arten abgebildet werden. Diese können aber für intensivere Cortinarien-Studien eine gute Grundlage bilden.

Der zu den Abbildungen gehörige Text besteht aus einer ausführlichen Beschreibung und Mitteilungen über Vorkommen, Verbreitung, Giftigkeit oder Geniessbarkeit der einzelnen Arten. Die wichtigeren Synonyme werden stets zitiert und oft auch kritische, vor allem die Unterscheidungsmerkmale gegenüber ähnlichen, zu Verwechslungen Anlass gebenden Arten berücksichtigende Bemerkungen mitgeteilt.

Das schöne, vorzüglich ausgestattete Werk wird mit Rücksicht auf die grossen, prächtigen, naturgetreuen Abbildungen auch von den der tschechischen Sprache nicht mächtigen Pilzfreunden mit Vorteil benützt werden; seine Anschaffung kann allen Interessenten wärmstens empfohlen werden, zumal auch der Preis als sehr niedrig zu bezeichnen ist.

F. Petrak.

Premier Colloque Européen sur la Rouille Noire des Céréales (*Puccinia graminis*). Versailles (France). — Octobre 1958.

Am 4. Internationalen Kongress zur Bekämpfung der Pflanzenkrankheiten, der im September 1957 in Hamburg stattgefunden hat, wurde beschlossen, von Zeit zu Zeit über besonders wichtige, phytopathologische Probleme Kolloquien zwischen Spezialisten zu veranstalten. Auf mehrfache Anregungen wurden die das Auftreten des Schwarzrostes der Getreidearten in Europa betreffenden Probleme für das 1. Kolloquium zur Diskussion gestellt. Von den dazu eingeladenen Spezialisten sind 30 aus 8 verschiedenen Ländern Europas und je ein Vertreter aus Israel und Marokko erschienen. Das Kolloquium wurde am 13., 14. und 15. Oktober 1958 am Centre National des Recherches Agronomiques de Versailles und an der Ecole Nationale d'Agriculture de Grignon abgehalten und beschlossen, im Jahre 1960 wieder eine Zusammenkunft zu veranstalten, für die jedoch der Ort noch nicht festgesetzt werden konnte.

Die anlässlich dieses Kolloquiums erzielten Ergebnisse wurden unter dem Titel „Documents relatifs au Colloque" herausgegeben und enthalten folgende einzelne Artikel:

Basile, Rita, Razze fisiologiche di *Puccinia graminis* var. *tritici* isolate da *Berberis vulgaris* e *Berberis aetnensis* in Italia negli anni 1956—1957 e 1958.

Guyot, L., Rôle des Graminées spontanées dans l'épidémiologie de la Rouille noire des Céréales en Europe et Afrique septentrionale.

Guyot, L., Malençon, G., et Massenot, M., Rôle des *Berberis* dans l'épidémiologie de la Rouille noire des céréales en France, Espagne et Maroc.

Chevalier, R. et Massenot, M., L'épidémie de Rouille noire en France en 1958.

Ogilvie, L. and Thorpe, J. G., The Distribution of the epidemic of Black Rust of wheat in Great Britain 1958.

Overlaet, J., Contribution à la connaissance de l'épidémiologie de la Rouille noire sur blé (*Puccinia graminis* tritici Erikss et Henn.), et moyens de lutte dans les Conditions culturales de Belgique.

Santiago, J. C., European collaboration about black stem rust epidemiological research.

Santiago, J. C. et Salazar, J., L'épidémie de la Rouille noire du blé au Portugal et en Espagne, en 1958.

Urries, M. J., A propos de quelques récoltes en Espagne d'Urédinées à l'état *Uredo* sur Graminées pendant les mois d'hiver.

Macer, R. C. F., Phisiologic specialisation of *Puccinia graminis tritici* (Pers.) in the United Kingdom.

Massenot, M., Les races physiologiques de *Puccinia graminis tritici* en Europe et dans les pays du bassin méditerranéen.

Sibiliá, C., Fluttuazione delle piu importanti razze fisiologiche di „*Puccinia graminis* var. *tritici* in Italia e comportemento di alcune razze di grani".

Bouchet, R., La Rosee — Definition & mesure — (I).

Hirst, J. M., Methods for trapping *Puccinia graminis* uredospores.

Vincent, A., Comportement des variétés et création de variétés résistantes à *Puccinia graminis tritici.*

F. Petrak.

Robyns, W., Flore Iconographique des Champignons du Congo. Illustrée en couleurs par Mme. M. Goossens-Fontana. — Jardin Botanique de l'Etat, Bruxelles, Rue Royale 236.

Fasc. VIII. *Cantharellineae* par P. Heinemann, p. 153—165, Tab. XXVI—XXVIII. 1959.

Das soeben erschienene 8. Heft dieses prächtigen Abbildungswerkes, über das schon in Sydowia X. p. 320 (1956, ersch. 1957) und XI. p. 482 (1957, ersch. 1958) berichtet wurde, behandelt die Familien der Cantharellaceen und Neurophyllaceen. Von der zuerst genannten Familie werden vier Gattungen angeführt von denen *Goossensia* und *Pseudocraterellus* nur durch je eine Art vertreten sind; von *Craterellus* werden vier, von *Cantharellus* siebzehn Arten angeführt, die sich auf vier Sektionen verteilen, von denen zwei neu aufgestellt werden. Die Neurophyllaceen sind nur durch eine Gattung mit einer einzigen Art vertreten. Von den angeführten Arten sind die meisten — wenigstens vorläufig — wieder Endemismen des Kongogebietes. Die Abbildungen sind besonders schön und können als musterhaft bezeichnet werden.

F. Petrak.

Sousa da Camara, Emmanuele de †, Catalogus systematicus Fungorum omnium Lusitaniae I Basidiomycetes. Pars 1 Hymeniales. Lisboa, 347 pp. 1956.

Im vorliegenden, mit Unterstützung von sieben verschiedenen Instituten und wissenschaftlichen Gesellschaften herausgegebenen ersten Bande des Kataloges der Pilze Portugals werden 1053 Arten aufgezählt, die sich auf folgende Familien (Anzahl der Arten in Klammern) verteilen: *Agaricaceae* (728), *Polyporaceae* (161), *Hydnaceae* (53), *Clavariaceae* (34), *Thelephoraceae* (117). Bei jeder Art werden alle Synonyme angeführt, unter denen der betreffende Pilz in den die portugiesische Pilzflora berücksichtigenden Arbeiten angeführt wird und ausführliche, sein Vorkommen und seine Verbreitung in Portugal betreffende Angaben gemacht. Alle Mykologen, die sich mit der Pilzflora Portugals beschäftigen, werden dieses Werk gerne und mit Vorteil benützen, obwohl ihm hauptsächlich die veralteten Ansichten Saccardo's zugrunde liegen und die giltige Nomenklatur kaum berücksichtigt wurde.

F. Petrak.

Stapp, Carl, Pflanzenpathogene Bakterien. Eine Einführung mit Hinweisen auf einschlägige bakteriologische und serologische Arbeitsmethoden. 260 pp., 100 Abbildungen. 1958. — Paul Parey-Verlag. Berlin und Hamburg. — Ganzleinen DM 32.—, kartoniert DM 29.—.

Verf. hat für die sechste Auflage des von Sorauer begründeten „Handbuches der Pflanzenkrankheiten" die zweite Lieferung des zweiten Bandes bearbeitet, welche 1956 erschienen ist und die bakteriellen Krankheiten behandelt. In dieser erschöpfenden Darstellung wurden von dem als ausgezeichneten Kener der Pflanzenbakteriosen einen internationalen Ruf geniessenden Autor alle bisher bekannt gewordenen, durch Bakterien verursachten Erkrankungen der Pflanzen behandelt und ein Standardwerk geschaffen, in welchem dieses schwierige Wissensgebiet eine meisterhafte Bearbeitung erfahren hat. Für die Praxis des nur an Bakteriosen der Kulturpflanzen interessierten Phytopathologen dürfte die im Handbuch der Pflanzenkrankheiten erschienene, enzyklopädische Bearbeitung der pflanzlichen Bakteriosen wohl zu ausführlich sein. Deshalb wird in dem vorliegenden Buche eine Auswahl von 24 Bakterienarten gebracht, die für Mitteleuropa besondere Bedeutung haben und oft grosse Schäden an den von ihnen befallenen Kulturpflanzen zu verursachen pflegen.

Im allgemeinen Teil wird die bakteriologische Technik besprochen, deren Beherrschung und richtige Anwendung für erfolgreiches Arbeiten unbedingt erforderlich ist. Die Herstellung der Nährböden und Reinkulturen werden beschrieben und die für die Identifizierung und Benennung der Bakterien notwendigen Untersuchungen erörtert. Von jeder im speziellen Teile angeführten Bakterienart werden die charakteristischen Merkmale, Krankheitssymptome, Infektionsmöglichkeiten, Ausbreitung in den Organen des Wirtes, Resistenz, die bisher festgestellten Wirtspflanzen, Verbreitung und Bekämpfungsmöglichkeiten geschildert und die oft sehr zahlreiche, wichtigere Literatur zitiert.

Das vortrefflich ausgestattete, mit 100 sorgfältig ausgewählten, vorzüglichen Abbildungen versehene Werk wird nicht nur den Studierenden der Botanik, Biochemie, Landwirtschaft und Phytopathologie ein vortrefflicher Wegweiser sein, sondern auch den Fachleuten bei ihren Arbeiten über Pflanzenbakteriosen ein wertvoller Ratgeber sein.